

THE
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EDITORIAL.

Tobacco.

For many years past it has been usual for Malays to grow small areas of tobacco near their homesteads, or on newly opened land. The crops have been consumed locally and the areas have been so small and the planting so spasmodic as to be without influence on the local market.

Tobacco cultivation has hitherto failed to attract European capital and the isolated attempts that have been made by European proprietary planters to cultivate and market this crop in the form of cheroots have generally failed through lack of marketing organisation, or of sufficient capital.

Fifteen years ago, experiments in tobacco cultivation were conducted by the Department of Agriculture, S.S. and F.M.S. in the Negri Sembilan and Pahang. Reasonably good crops were grown, especially in the latter State, where the soil proved more suitable, but the authors, in their account of this work, expressed their doubts as to whether the progress thus far made in the introduction of tobacco seed proved the suitability of the crop for European planters, especially in view of the fact that from the experiments they were unable to obtain sufficient data regarding yields.

It is to be noted that although the local production of tobacco has been negligible, yet the manufacture of the cheaper brands of cheroot in Malaya has for some years been of importance. This industry developed by reason of the fact that the import duty on unmanufactured tobacco was considerably less than that on manufactured tobacco and on cheroots.

Recent increases of import duty on all classes of tobacco, coupled with the fact that there is no excise duty on locally grown tobacco, has led to renewed interest in the cultivation of tobacco in this country, and there has in fact, been an appreciable increase in the area cultivated by Asiatics.

The fact that the cultivation of tobacco is increasing proves that the Asiatic small-holder has welcomed a crop which in these hard times given him a quick monetary return, although he may be aware that the price he obtains is but a fraction of its true value; also the buyer is obviously satisfied with the present arrangement.

There are, however, definite limits to which expansion of tobacco growing as carried on at present, can develop. The most obvious limiting factor is governed by local demand; this class of tobacco being entirely unsuitable for export purposes.

It follows, therefore, that any considerable extension of the area under tobacco must coincide with the production of a higher grade leaf, in particular a product which is suited to the manufacture of cigarettes. The successful production of a bright cigarette leaf would materially extend the market in Malaya for locally-grown tobacco, especially in view of the cigarette factories now established in Malaya.

It must not be supposed that locally grown tobacco will enjoy definitely freedom from taxation. We regard it as probable that an excise duty would be imposed if Government found that revenue was seriously affected by local production. It is reasonable to suppose, however, that any excise duty levied would be less than the import duty, so that tobacco cultivation in Malaya would receive thereby some measure of protection.

Included in this number is the first of a series of articles dealing with the cultivation of tobacco in Malaya. It deals with the general cultivation of the crop, based particularly on the experience obtained in Malaya and including the preliminary results of work at the Government Experimental Plantation, Serdang. These results are encouraging and although we have not yet reached a point where we can definitely recommend types of tobacco and methods of curing — data which it is hoped will attract capital to this crop — we have taken the first step towards the achievement of our object.

It is apparent from the information available, that definite scope exists in Malaya for the production of tobacco for the purpose of supplying the local market in which the opening is two-fold; firstly, for the type of tobacco for making cheroots and secondly, for bright tobacco used for making cigarettes of the Virginian type.

In our endeavours to establish this local industry we have the example of success under very similar conditions in another colony. The various aspects of this subject are being given very close study by the Department of Agriculture, and in this connection we would mention that we are receiving very material advice from the experts of an important manufacturer of cigarettes.

Tobacco growing is likely to prove suitable for Asiatic small-holders as well as for capitalists, provided that the type of leaf can be established and that a method of curing suitable to local conditions, can be perfected.

The public, therefore, would be well advised to follow the progress of this work so that the opportunity may be taken to apply the experimental results to a commercial scale, thus enabling the local industry to reduce materially the annual bill of over \$20,000,000 which is the average annual sum expended on the import of tobacco for local consumption.

**San Blas
Coconuts.**

An article contributed to this number by Mr. A. C. Smith, a practical coconut planter, gives an interesting account of the behaviour of the San Blas variety of coconut when grown on the heavy alluvial clays of Malaya.

The author shows that although this variety of coconut is recognised in Central America as prolific, under Malayan conditions it compares unfavourably with the local tall variety of coconut.

The carefully observed comparison of an introduced variety of repute with local varieties is of great value and in taking this opportunity of thanking our contributor, we trust that his experience may prove of value to other planters who in the future, may contemplate the introduction of this variety for cultivation under conditions similar to those recorded in the present instance.

**Agriculture in
Brunei.**

The Director of Agriculture, S.S. and F.M.S., Dr. H. A. Tempany, undertook a visit to Labuan and Brunei in August of this year to advise the Governments concerned on certain aspects of agriculture in those countries.

Labuan, part of the Straits Settlements, was visited by Mr. W. N. Sands of the Department of Agriculture, who contributed an article on the agriculture of that territory in this journal of April, 1930.

Hitherto, as far as we are aware, no account has been published on the agriculture of Brunei. The account which will be found in the current number of this journal constitutes part of the author's report to the Government on his visit.

It will be seen from the following account that the agriculture is mostly contained in small-holdings, and is capable of improvements in several directions with the aid of moderately conceived agricultural services aiming at the provision of better seed and other planting material suitable to local conditions and the general encouragement of agriculture by methods which have proved successful under somewhat similar conditions in other countries.

THE CULTIVATION OF TOBACCO IN MALAYA

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The altered economic conditions in Malaya have caused the planting community, especially the small-holder who requires short-duration crops to provide an income, to seek for remunerative crops in place of rubber. Previously, the cultivation of tobacco in Malaya received little consideration, although attempts were made by the Department of Agriculture to bring its possibilities to the notice of cultivators as far back as 1917 (*Agricultural Bulletin, F.M.S.*, Vol. VI, page 254.)

As rubber is now almost unremunerative, and the import duties on tobacco have been increased, there is a double inducement to the planting communities of all nationalities to grow this crop.

At present there is no excise duty on tobacco in Malaya, but the possibility of duty being imposed must be considered in view of the likely falling off of revenue from customs import duties on the commodity, if local planting becomes extensive.

Customs duties are levied on the dried leaf and the manufactured product, irrespective of their origin, when imported into the Federated Malay States, which includes, Perak, Selangor, Negri Sembilan, and Pahang, or into the Straits Settlements, or each of the Unfederated States of Johore, Kedah, and Kelantan.

Table I shows the import duties on tobacco in force at the present time (June, 1932).

Import duties are not levied on the movement of tobacco from one State to another within the Federation, or within the Straits Settlements.

There is no reason why low-grade tobacco grown in the Malay States should not be able to compete with foreign-grown tobaccos for the extensive markets of Singapore and Penang, but such leaf will, of necessity, have to be of equal, or better, quality to obtain a share of these markets which are at present in the hands of importers of foreign-grown tobaccos.

In Table II the net imports of tobacco into Malaya for the five years 1927-31 are shown.

TABLE I.

Import Duties on Tobacco of the various States of Malaya.

Description of Article	F.M.S. preferential duty on Empire tobacco.	F.M.S.	S.S.	Johore	Kedah	Kelantan.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
(a) Cigars and snuff	—	1.60 per lb.	1.60 per lb.	1.60 per lb.	1.60 per lb.	1.60 per lb.
(b) Cigarettes	1.00 per lb.	1.10 "	1.10 "	1.10 "	1.10 "	1.10 "
(c) Unmanufactured tobacco	—	.70 "	.70 "	.70 "	.70 "	.70 "
(d) Manufactured tobacco excluding cigars, cigarettes and snuff.	—	—	—	—	—	—
(i) If imported for sale to the public in air-tight tins or containers.	1.00 "	1.10 "	1.10 "	1.10 "	1.10 "	1.10 "
(ii) Not otherwise provided for.	—	.80 "	.80 "	.80 "	.80 "	.80 "

The tobacco grown for smoking purposes is generally the species *Nicotiana tabacum*; another important species is *N. rustica* which is grown principally for the production of nicotine for use as an insecticide.

The tobacco plant is very adaptable and thrives over a very wide range of climatic conditions. It follows that a multitude of varieties have been evolved to suit the varying conditions of temperature, rainfall, and the fastidious demands of the trade.

Tobacco thrives best in a fairly light loamy soil. The soil, however, has a powerful influence on the quality and type of the cured leaf; for instance, light loams will produce light-bodied leaves as used for the lighter cigarettes, whereas heavier soils grow full-flavoured thick-leaved tobacco, suitable for cheroots, pipe tobacco and chewing.

It is essential, therefore, that the right type of soil should be chosen on which to grow the tobacco and further, it is necessary that the right varieties for a particular market should be kept in view.

Tobacco thrives best on land that has been recently reclaimed from "Belukar"* or virgin jungle; in general, the best quality tobaccos grow on virgin land. This is particularly true of clay loam soils, and is possibly due to the humus contained in the soil. Humus retains moisture and has an ameliorating effect on the mechanical condition of the land. Areas which have

* belukar, scrub growth on uncultivated land.

TABLE II.
Net Imports of Tobacco into Malaya.

YEAR	CIGARS		CIGARETTES		MANUFACTURED		UNMANUFACTURED		TOTAL	
	Quantity lbs.	Value \$	Quantity lbs.	Value \$	Quantity lbs.	Value \$	Quantity lbs.	Value \$	Quantity lbs.	Value \$
1927	159,425	388,060	7,102,898	17,736,695	5,544,427	4,256,552	6,374,826	2,078,110	19,181,576	24,459,417
1928	98,865	300,917	7,132,069	18,620,822	5,204,669	3,803,965	6,500,114	2,208,792	18,935,717	24,934,496
1929	109,218	337,708	7,648,710	20,006,297	6,093,262	4,211,450	7,681,756	2,451,008	21,532,946	27,648,876
1930	121,046	261,354	5,920,521	16,899,787	6,180,408	3,900,332	7,663,811	2,651,558	19,885,786	23,713,031
1931	80,114	182,176	3,503,537	10,267,096	4,490,116	2,219,625	6,290,958	1,885,337	14,364,725	14,554,234

continually grown crops of tobacco will not produce first quality leaf, regardless of the amount of chemical fertiliser applied. To obtain such ideal conditions as mentioned above, the practice in Sumatra is to grow tobacco once on the same land every seven years, and during the intervening six years to allow the land to revert to "belukar."

If tobacco is grown continually on the same area, the damage done by pests and diseases increases to a marked degree. Should the land be too valuable to be allowed to revert to an uncultivated state, it is advisable to establish a rotation of crops, which should not include brinjal or tomatoes, as these crops belong to the same natural order and are more likely than other crops to carry tobacco pests and diseases.

It is not recommended that tobacco be grown in a rotation more often than once in two years, even when healthy crops have been harvested, and in cases where loss has been caused by pests or disease, it is advisable to allow a longer interval between the crops.

Consideration of the details of cultivation and of pests and disease treatment given below, will clearly indicate that the successful cultivation of tobacco requires considerable expenditure of labour. Prospective growers should bear this fact in mind when deciding on the area to be planted.

Influence of Climate.

The tendency in countries of excessive rainfall, such as Malaya, is to produce a thin papery leaf of large dimensions, with little aroma, gummy matter or nicotine, and for this reason it is recommended that tobacco be planted at the beginning of the long dry season. This tendency renders necessary very careful investigation in the field before recommendations can be made for the commercial growing of Virginia types which are used for the preparation of all the well-known brands of Virginia cigarettes and must exhibit certain definite leaf characters. Although two Virginian types, Joyner and Hickory Prior, were included in the trials described in this article, it must be clearly understood that their cultivation is not yet recommended by the Department of Agriculture; moreover, experience in other countries indicates that recommendations for manuring given on page 561 may need considerable modification if loss of quality in these types is to be avoided.

Varieties taking an average of about 130 days from sowing the seed to harvesting the crop are planted at the Government Experimental Plantation, Serdang, during the month of March; this practice results in the plants growing good marketable leaves with heavy body and aroma and allows of the harvesting of the crop during the most suitable weather of the year.

Manuring in the Field.

As previously mentioned, tobacco thrives best on land containing a fair proportion of humus. Humus derived from decaying vegetable matter is con-

sidered preferable to that resulting from the application of heavy dressings of cattle manure, since it is likely that such heavy dressings on average soils contain more nitrogen than is required.

If virgin land is not available, or green manures cannot be incorporated into the soil, moderate dressings of cattle manure up to about 10 tons per acre are recommended, and in order to balance the principal ingredients of plant food in the soil for this crop, applications of phosphates and probably of potash, will be necessary.

All the manures should be applied whilst the land is being prepared for planting, preferably before the last ploughing or turning over of the soil.

The following dressing of chemical manures might, with advantage, be applied in addition to the cattle manure, or a similar application of green manure :—

Basic slag	...	2½ cwt. per acre.
Sulphate of potash	...	¾ cwt. per acre.

Should the tobacco plants be slow-growing and not of a deep green colour, it may be advisable also to give a top-dressing of about ½ cwt. per acre of nitrate of soda or calcium cyanamide.

Experiments on the manuring of tobacco at the Government Experimental Plantation, Serdang, have shown that on a poor, gray, sandy-loam of known infertility, the application of heavy dressings of a complete mixture of chemical fertilisers* without farm-yard manure gave negative results. This was also true of plots on which a concentrated organic mixture was applied. Cattle manure without inorganic manures gave a good growth, but cattle manure and chemical fertilisers together gave slightly better results. This soil is not typical and the results should not be taken as being of general application.

Influence of Fertilisers on the Leaf.

Excess of nitrogen in the soil will cause the crop to grow too vigorously, producing large plants having thin papery leaves. Phosphatic manures have a tendency to accelerate maturity.

Potash has an influence on the burning quality of manufactured leaf. An abundance of this element in the leaf induces free burning and the production of a white ash—desirable characters in a cigar tobacco. A deficiency of potash is said to derange the metabolism of the plant, resulting in distorted, crinkly leaves similar in appearance to those of the savoy cabbage; this effect is most noticeable during the second month of the life of the plant. A similar appearance may, however, be caused by a disease.

Soil and Situation of Plots at the Government Experimental Plantation, Serdang.

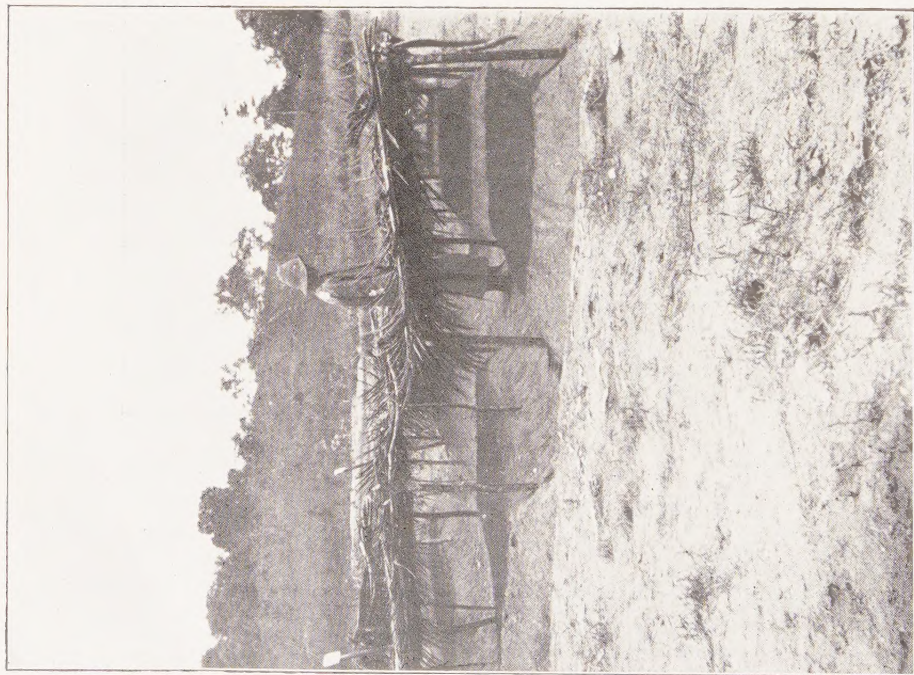
Experiments on tobacco were conducted in the General Nursery during 1931.

* Ammonium sulphate, superphosphate and sulphate of potash in 1931.

Calcium cyanimide, basic slag and sulphate of potash in 1932.



HICKORY PRIOR "BAGGED" FOR SEED.



TOBACCO NURSERIES SHADED WITH ATTAP THATCH.



TOBACCO NURSERY SHADED WITH CALICO :
GOVERNMENT EXPERIMENTAL PLANTATION, SERDANG.

The soil might be described as a well-drained, light, sandy loam, fairly dark in colour, varying to a medium brown loam.

Preparation of the Nursery Beds.

Nursery beds about three feet wide, were made with one-foot-wide paths between each bed.

The surface of the soil of these beds was scorched by burning dry palm leaves and rubbish which had been spread during dry weather to a depth of about 6 inches. The soil was afterwards turned over and the scorching repeated a second time.

Well decomposed cattle manure at the rate of about 10 tons per acre was dug into the soil and a fine seed bed prepared by further cultivation.

Care of the Young Plants in the Nursery.

Young tobacco plants are very delicate, they cannot withstand the beating action of heavy rain, and they thrive best if protected from the direct rays of the sun, for the excessive moisture in the nursery beds encourages fungus diseases to attack the young plants; for these reasons arrangements must be made to protect the plants and it is customary to shade the nursery beds with strips of calico.

At Serdang for this purpose, hard-wood posts were placed at the four corners of each bed, that is, at intervals of 33 feet, to which were attached wires of about No. 12 gauge. Three wires were stretched along each bed, the width between the outside wires being 30 inches, the side ones being about 1 foot above the ground and the centre one about 15 inches high; the wires were also stretched across the ends of the beds. To these wires was fastened bandage cloth or unbleached calico, 34 inches wide, which had been dipped into "bakau" dye to preserve it against the action of sun and rain. The calico was fastened by folding the edges over the wire and pinning with the midrib of coconut leaflets. Pins of split bamboo would be equally suitable for this purpose.

The cloth which is known locally as "kain belachu" cost about \$2.20 per roll of 26 yards.

Woven ataps*, such as are used on bullock carts might be employed instead of calico.

The above practice provides top shade and protection from rain, but an alternative method would be to use a wider cloth and close up the sides at night to stop the ingress of insects, so preventing them from laying their eggs on the plants. In the latter case, weights would be used to keep the cloth in position and the pins would not be necessary.

* "ataps" = palm leaves, used as a roofing material.

This alternative method would also facilitate watering and attention to the plants, as in any case it is necessary to remove the cloth periodically. Weights would be easier to remove and replace than bamboo pins.

It is essential that the beds should not be kept too moist; excess of watering or rain will encourage damping off, which is caused by a fungus attacking the tiny seedlings. When tobacco is grown on small areas, the seedlings may be raised in boxes under shade.

Watering is preferably carried out in the evenings. Morning watering tends to cause a hard, compact top-soil in the beds, resulting in great loss of moisture from the soil surface by evaporation. This applies more to nursery beds exposed to the direct rays of the sun than to the shaded beds. Should the watering be carried out in sunshine the leaves will be scorched.

Sowing the Seed.

One ounce of tobacco seed contains about 300,000 to 400,000 seeds; this amount, allowing for the usual high percentage of losses, under expert management is sufficient to provide plants for four to five acres. For a 3 feet wide seed bed, one chain long, on which the seed is sown on a central strip $2\frac{1}{2}$ feet wide, a teaspoonful of seed only is required. To facilitate sowing, the seed should be mixed with a half pound of fine sand, wood ashes, or a similar amount of a dry, non-acid artificial manure such as sulphate of potash.

The seed should be sown on very fine well-prepared seed beds and it is unnecessary to cover it. The surface, however, should be lightly pressed to consolidate the top soil, subsequent watering with a very fine spray from a watering can being sufficient to wash the seed into the surface of the bed.

The treatment for the following two or three weeks consists of gently watering and hand-weeding. A careful watch for insect pests must be maintained and hand-picking of all types of leaf-eating insects should be carried out daily.

The seed takes about six days to germinate. It is desirable, after the seedlings have made a little growth, to remove the shade for an hour or so each morning and evening so as to harden the seedlings and prevent them from growing too tall. This exposure can be lengthened as the seedlings become older.

The aim is to grow very short-stemmed plants producing wide, round leaves fairly close to the ground: such seedlings can only be obtained by growing on a fertile soil and with an adequate control of light and moisture.

If the germination of the seed is good and the seed bed becomes overcrowded, it will be necessary to thin out from the most congested places and to transplant the lifted seedlings into similar, covered nursery beds. This operation can be carried out when the plants are about two weeks old. It has been observed at Serdang that such transplanted seedlings suffer no setback and eventually produce excellent plants, maturing a few days earlier and producing a yield of leaf in no way inferior to that obtained from the plants left in the original beds.

It must be appreciated that the young tobacco plant is exceedingly delicate and requires considerable attention during all stages of its growth. It is a valuable crop and the financial return from a correctly grown crop should amply repay the cost of close attention during the whole period of growth.

Preparation of the Land.

As practically no land in Malaya is sub-soil drained, it is necessary, on flat land, to plant the seedlings on raised beds. This not only facilitates drainage but allows of access to all the plants in the area.

Such beds, about 4 feet wide, will allow of two rows of plants, spaced on the triangular planting system, about 2 feet 8 inches apart giving a distance of 3 feet between the plants, and a margin of 8 inches from the outside plants to the edge of the path. Allowing for paths one foot wide, this arrangement gives approximately 5,800 plants per acre.

The planting distance should depend on the variety grown. The experience gained at the Government Experimental Plantation, Serdang indicates that the following varieties require the full 3 feet spacing:—Joyner, Hickory Prior, White Burley, Jaffna, Burmese tobacco, Deli, Thattayan, and Dunbara whilst the other varieties tried, namely, Burmese Havana, Bhengi, Shwegyan may be planted a little closer.

The planting distance also depends on the fertility of the soil, on rich lands the plants being spaced wider; on poor land the fertility should be improved by the application of manures and the distance allowed as detailed above.

An alternative method on wet land is to plant on ridges which can be spaced about 3 feet apart.

On free-draining, sloping land the usual method of planting is on terraces.

The land must be ploughed or dug over and if the tobacco is grown on a rotation of crops system, a dressing of well-rotted cattle manure should be applied at the rate of about 10 tons per acre. If cattle manure is not available, it is recommended that a quick-growing leguminous, green-manure crop should be grown, preceding the tobacco, and be incorporated into the soil when still in the green state but almost mature. The planting programme should be so arranged that this operation takes place about six weeks before the tobacco is ready to transplant. Suitable green manures for this purpose are horse gram, soya beans, cow peas, or some of the well-known cover crops.

An alternative method of green-manuring suitable for the small-holder is to transport from nearby land succulent green leaves or herbage and incorporate it into the soil some time before planting the tobacco.

It is recommended that the whole of the beds be manured rather than to confine such manuring to the sites occupied by individual plants.

About two months after sowing the tobacco seed, the plants should be about 4 to 6 inches high, well developed, sturdy, and fit to transplant into the field. All sickly, badly grown or "leggy" plants, including those with twisted roots, or showing signs of disease, should be discarded. In this connection, good-

looking plants showing slight black streaks on the roots should be burnt as these indicate attacks of fungus diseases.

The plants should be carefully lifted and transplanted without loss of time, care being taken that the seedlings are not exposed to the sun. In well-cultivated land, the plants can be dibbled in by making a hole with a pointed peg, into each of which a seedling is planted, precautions being taken to ensure that the tap-root is not curved while being planted. The soil should be firmly pressed on all sides against the tap-root, while on the heavier soils care must be exercised to avoid leaving an air pocket at the bottom of the dibble-hole.

It is essential that the plants be lightly shaded by a few small, leafy branches or palm leaves, placed a few inches distant in a leaning manner to over-hang the transplanted seedling. The leaves of such shade will shrivel and die in a few days and will gradually allow more sunlight to penetrate to the plants and may be removed after about one week to ten days.

Transplanting should be carried out in rainy weather, preferably in the evening.

Should the weather after transplanting become dry, the cultivation of about two inches of the surface of the ground will form a mulch and preserve the soil water. This method is better than early resort to hand-watering, but if the rainfall is so light that hand-watering is considered necessary, then it should be accompanied by surface cultivation, as watering consolidates the surface of the soil and causes excessive losses of moisture by evaporation. In this connection, it must be remembered that the crop is being grown during the dry period of the year.

During the growth of the crop, a certain amount of surface cultivation will in any case be desirable in order to check the growth of weeds.

Priming is the operation of removing two or three small basal leaves from the plants; this appears to invigorate the plants and causes them to grow faster and more robust; it also allows a free passage of air at ground level which tends to decrease the incidence of disease.

Topping.

For the production of high grade leaf, except for special markets, it is necessary to prevent the plants producing flowers and seed. If very thick, gummy leaves for fillers in cigars, or for chewing tobacco, are required, then only a limited number of leaves per plant must be allowed to mature and consequently low topping will be necessary, on the other hand, if the market requires a light-bodied leaf for such a trade as cigarettes and cigar wrappers, then higher topping may be practised.

Very low topping, allowing only 5 or 6 leaves per plant, will tend to produce a very rank and coarse tobacco.

For the production of seed, a few good plants should be allowed to flower. Flowering plants of different varieties should be grown at distances as far apart from each other as is practicable in order to prevent cross pollination and the



TOBACCO PLANT, 3 FEET HIGH, BEFORE TOPPING.



TOPPING THE TOBACCO PLANT.



TOBACCO PLANT AFTER TOPPING.



WHITE BURLEY TOPPED FOR LEAF PRODUCTION.

consequent production of hybrid seed.

Should it be impossible to grow the different varieties for seed at some distance apart, then in order to produce pure seed, recourse must be had to bagging the flowers. The disadvantage of bagging is that a very much lower quantity of seed will be produced per plant, as the flowers are not so freely fertilised when thus confined. Muslin bags about 2 feet x 2½ feet are ample in dimensions; these should be placed over the flowers and tied around the main stem. One unbagged plant will, under ordinary conditions, yield about a quarter of a pound of good seeds, but it will probably require half a dozen bagged plants to yield a similar amount.

Suckering.

At the Government Experimental Plantation, Serdang, about 5 days after topping it has been found to be necessary to remove the suckers which grow from the axils of the leaves. These suckers must be removed as they appear, and certainly before they have attained one inch in length, otherwise they will deprive the leaves of the nourishment conserved for them by the operation of topping. Such suckers should be nipped off by means of the finger nails as close as possible to the axil of the leaves.

Harvesting.

The time of planting of tobacco must be so arranged that the maturing and harvesting occurs during the dry weather. Should rain fall during the harvesting operations, it is advisable to postpone the work for a few days if possible, to permit the plants to produce a layer of gum on the leaves to replace that which has been washed off by the rain.

Leaf gum probably aids fermentation and helps to develop the desired aroma. Gummy leaf is greatly appreciated for pipe and cigar fillers by manufacturers. The danger of a delayed harvest is the rapid development of spots on the leaves, which become numerous as the plants get older. At the same time, in spite of a few spots, it is necessary to allow the lower leaves to attain their maximum development.

Tobacco is harvested when the leaves are in the green stage and have begun to droop. At this time, leaves become dark green and slightly more crinkled and the main stem turns a pale green.

As the tobacco plant approaches maturity, the main stem and mid-rib of the leaf become brittle, whereas previously they were tough and would bend rather than break. It is necessary to judge the ripeness of pale green leaved varieties such as "White Burley" by applying the last mentioned test.

Systems of Harvesting.

- (1) Harvesting single leaves in several rounds.
- (2) Harvesting two or three basal leaves and afterwards the whole plants.

(3) Harvesting the whole plant in one operation.

The harvesting of single leaves can only be applied to small holdings or, in the case of large estates, where labour is cheap and plentiful. The operation is usually divided into about three harvesting "rounds" at intervals of several days.

The first leaves to be collected are those liable to touch the ground and so become damaged. Such leaves are often picked when in the early stage of ripeness, the remaining leaves being collected as they ripen.

In the second method, the basal leaves are harvested for the reasons mentioned previously, later the plant is cut a few inches above ground.

The third method, that of harvesting the whole plant in one operation, is usually confined to the coarse varieties.

Treatment of the Crop after Harvesting.

When individual leaves are cut they are withered by hanging in sheds by the leaf stalk, on ropes, poles or wires. The air-drying barn is usually built of attaps or thatch, with sides, doors and windows of the same material. The windows must be capable of being opened, thus allowing of some control of the barn temperature and ventilation.

If the whole plant is harvested in one operation, it is usually effected by cutting the stem with a knife about six inches above the surface of the ground. This operation must be carried out when the leaves are dry, that is, after dew or rain has dried off. The plants are hung in the withering barn by passing a stick 3 to 4 feet long through the main stem near the base; the stick carrying several plants, is placed on cross members in the withering shed. It is advisable to have the plants so spaced that they do not touch each other. An alternative arrangement in the drying barn is to pass short pegs through each plant and hang them by means of the peg on to poles set close together in the withering shed. The plants are hung in tiers one above the other, to the top of the shed.

If it is desired to keep the leaves more separate from each other than is possible by hanging whole plants, then the main stem can be cut transversely between each leaf, and each leaf, with a small portion of main stem attached is hung by the simple process of hooking it on to a wire or rope. Other methods of hanging the individual leaves are by loosening the strands of a stretched rope and placing the leaf stalks in the opening so made, afterwards allowing the strands of the rope to close on the stalk, or by cutting a cleft in the leaf stalk and by means of the cut hanging the leaf onto a stretched wire.

The following are abstracts on air-curing by Corbett, Bulletin 33, Department of Agriculture, Mauritius, which apply in general to the air-curing of tobacco for heavy cigarettes and cheroots:

"Air-curing consists of allowing the leaf to go through a natural process of curing without the aid of artificial heat and the success of the curing is to a great extent dependent upon the atmospheric conditions prevailing. A good deal can be done to control these conditions by suitable

barns in which ventilation is under control, and small barns give better results than large ones.

The curing goes through two stages, the first commencing when the leaf is harvested, by cutting the plant just before the maturity of the leaf is fully ripe, and ends at the disappearance of the green colour which is replaced by a lemon yellow colour. It is during this stage that the barn must be so regulated that the leaf does not dry too quickly or too slowly. If it dries quickly the leaf will retain its green colour and be of little value, and if too slowly the curing will be carried too far. This stage is really a process of slow starvation and the most favourable conditions are obtained with a temperature of 28° — 38° C. and a humidity of 35 per cent. (82° — 100° F.).

From this stage the leaf passes to the second stage and in order to get the bright leaf, the curing must be hastened by reducing the moisture in the barn and hastening the drying. This is a difficult matter during wet weather and the leaf during such times will invariably become a dark colour, but in a good season, by careful ventilation at the top and bottom of the barns, a good percentage of leaf suitable for manufacture of cigarettes will be forthcoming.

During wet spells a good percentage of the leaf can be saved by building small charcoal fires under the tobacco, the heat will prevent the curing being carried out too far by excess of moisture. By raising the temperature of the barn 20° C. the capacity of the atmosphere to hold moisture is doubled and if it is possible to keep the temperature of the barn 20° C. above the outside atmosphere during wet spells together with a little ventilation, the elements can be controlled. During such a period the bottom ventilation should be reduced and the top ventilation slightly increased.

The most suitable conditions for air-curing are clear, calm days, with a moderately dry atmosphere and a temperature of 26 — 32° C. (79 to 88° F.). Under such conditions the moisture is absorbed by the atmosphere as quickly as it is given off from the leaves and therefore oxidation does not take place.

During dry weather when the leaf is inclined to dry out a green colour, moisture should be introduced by wetting the floors of the shed during the first stages of curing, and the colour will depend on the way moisture is withdrawn during the second stage.

The best type of barn is one which can be filled in one or two days, and should be fitted with good ventilation at the bottom and top, so that the barn can be entirely closed if desired. A good size for a plantation of 5 acres or more is 32 feet x 16 feet x 7 feet to sill inside measurements. The interior of the barn should be fitted up with tiers which greatly facilitates the work."

Sweating of the leaf on the pole is caused by stagnation of the air and an atmosphere that is too humid. If the sweating is allowed to continue, the stalks will rot at the point where they are attached to the poles, wire or ropes; this condition indicates that the withering process is proceeding at too slow a rate and necessitates the use of a charcoal burner to hasten the process by raising the temperature of the atmosphere in the barn.

It has been observed at Serdang that the yellowing takes about six days, the room temperature varying between 80 — 90° F.

The withering of tobacco for cheroots occupies about 13 days. If the weather towards the end of the withering process is very dry, the withered

leaves will lose too much moisture and will be brittle and difficult to handle without damage. To prevent this, it may be advisable to water the floor so that the leaves will absorb moisture, so making them tough. An alternative method is to allow free ventilation to the withering shed during the night before the leaf is removed for fermentation; on the following morning the leaf will be found to have absorbed sufficient moisture to permit of handling without damage. Excess of moisture of the leaf will cause a rotting of the leaves during fermentation.

Fermentation for Cheroots and Chewing Tobacco.

This process depends on the amount of moisture present in the leaf at the conclusion of the withering process. At the Government Experimental Plantation, Serdang, when handling small crops, 25 per cent. of moisture appears to be about the optimum amount, as in trials, withered tobacco containing approximately this amount gave the best fermented leaf.

One method for fermenting consists of stacking the leaves, which have been stripped from the main stem, to form a circular heap about four feet wide and about six feet in height, the tobacco leaves being placed with the leaf-stalks to the outside and the stack built with a diameter sufficiently large to leave a small vertical funnel through the centre of the stack to permit of the insertion of a thermometer.

The leaves are laid flat and straight, the whole stack is covered with sacks or canvas to maintain an even temperature, especially at night. Small stacks, such as the above, are unlikely to overheat or ferment too quickly and should result in the production of a comparatively light tobacco.

Larger stacks with a square or rectangular base may be employed. Arrangements must be made when building them to permit the temperature near the centre of the bulk to be taken. This is often accomplished by laying a pipe in the bulk when stacking with one end to the outside and the other one near the centre, in which the thermometer may be placed.

Large stacks generally produce dark-leaved tobacco. The stacks should be made on a wooden floor and it is desirable to have the base raised on legs or bricks to permit a current of air to pass underneath the base.

During fermentation, changes take place, resulting in the development of flavour and aroma in the leaf. The rate of fermentation mainly depends in the amount of moisture in the leaf, this in turn influencing the temperature of the stack. Insufficient moisture causes a low temperature fermentation, whilst excess of moisture will cause a rotting of the leaves.

The temperature must be carefully controlled and should not exceed 120°F. for if it is allowed to become too hot, even with the moisture content normal, black rotting will take place. It should rise gradually to about 114°F. in about a week; to prevent it going higher, the stack should be pulled down, the leaves shaken out and the stack rebuilt. This process must be repeated as often as the

temperature rises to about 114°F. Fermentation will be completed in 5 to 6 weeks. Should the temperature fail to rise at any time during the first few weeks the stack will require rebulking. If the temperature, after the requisite period of fermentation, gradually drops, the bulk may be left until required for sale, but is it desirable that it be carefully watched for a possible further rise in temperature.

Tobacco bulks that fail to rise in temperature during the first few days will require to be pulled down, the leaves spread out and left in a shed with the windows open overnight and again bulked the following morning. The tobacco will probably have taken up sufficient moisture to commence fermentation, subsequent treatment being normal as described above.

Sun - Curing.

This method of curing is used for light tobaccos destined for the manufacture of cigarettes and is practised in many countries. It consists of harvesting the whole plant when about two-thirds of the number of leaves are ripe. The plants are hung by the main stem on to scaffolding in the shade, until the leaves become yellow, after which the poles, with the plants hanging from them, are exposed to the direct rays of the sun.

The tobacco plants must be carried under cover when rain falls and at nights to protect them from the dew; alternatively, the crop might be covered with portable frames carrying "lalang" grass thatch or ataps. Sail cloth is sometimes used for this purpose.

The Chinese method of sun-curing, which is practised on small holdings, has been tried with satisfactory results at the Government Experimental Plantation, Serdang. This method consists of harvesting single mature leaves and laying them flat between two frames tied together and constructed of half-inch bamboo laths; the dimensions of the frames are usually about 5 feet x 3 feet and such frames will only hold about 4 to 5 leaves at one time; the frames containing the leaves are stored overnight in a shed: only small crops can be handled in this manner.

Sun-curing takes 10 to 14 days according to the intensity and amount of sunshine. Care must be taken to dry the leaves thoroughly so as to prevent the growth of fungi during storage. Bulked sun-cured tobacco must be carefully watched to guard against fermentation. The flavour and aroma improve after the leaf has been bulked. For use on a large scale, or for the curing of Virginia leaf, this method cannot be recommended in Malaya, because of the uncertainty of the climate and the comparatively high cost.

No Virginian leaf is at present grown commercially in Malaya, although experimental work is in progress at certain of the Departmental Agricultural Stations. The work at Serdang includes investigation of curing in barns warmed by hot air, since it is certain that artificial methods will be essential for this type of tobacco in the humid climate of Malaya.

Yields.

The returns at the Government Experimental Plantation, Serdang, after calculating the weight of the finished product to be 20 per cent. of the freshly cut leaves, have been exceptionally good and have ranged between 10 to 18 piculs per acre. These figures are the results of well-cared-for crops, grown on small areas, with the addition of cattle and pig manure only.

Normal yields of correctly grown crops on average land should be 8 to 10 piculs of cured leaf per acre.

Table III gives the list of varieties tried at the Government Experimental Plantation, Serdang, during the year 1931, and includes particulars of their period of growth and yields.

Insects and Diseases.

Control measures are given hereunder for the commoner pests and diseases in Malaya.

The tobacco plant is very susceptible to the attacks of insects and diseases from the time the seed is sown until the crop is cured.

The writers wish to record their thanks to Mr. N. C. E. Miller, Assistant Entomologist, for his assistance in checking the section on insects and to Mr. A. Thompson, the Acting Mycologist of the Department of Agriculture, for his assistance with the section on diseases.

Insects*

A small ant, *Solenopsis geminata*, is frequently responsible for carrying away seeds. This ant may be controlled by pouring into the nests a disinfectant or boiling water, or by digging out the nests and destroying the contents. On a small scale the seed may be grown in boxes provided with short legs standing in a receptacle containing water having a film of kerosene.

Leaf-eating caterpillars and grasshoppers should, if possible, be hand-picked and destroyed. In the event of insects becoming too numerous for hand collection, spraying will be necessary. A useful general spray for leaf-eating insects is 1½ lbs. of lead arsenate to 50 gallons of water. As new leaves are formed it may be necessary to repeat the application. Dusting instead of spraying is often practised. For this method, which has proved satisfactory, lead arsenate powder is used, being mixed in the proportions of 4 lbs. lead arsenate to 4 lbs. of dust, wood ashes or air slaked lime. The total quantity is sufficient for 1 acre.

Tobacco Stem-borer.—The caterpillar of the insect *Phthorimea heliopa* often causes serious damage to the tobacco crop, but so far this pest has not been observed at Serdang.

* A fuller description of the insect pests of tobacco recorded in Malaya will appear shortly in this Journal.

TABLE III.

Yields and Periods of growth of varieties of Tobacco grown at
the Government Experimental Plantation, Serdang.

Variety	Class suitable for	Date Sown	Date germinated	Date transplanted	Date Flowered	Date leaves harvested	Wt. of green leaf from one bed, 4' x 66'	Calculated yield of green leaf per acre in lbs.	Calculated yield of dried tobacco in lbs.
Joyner	...	19.6.31	26.6.31	21. 7.31	14. 9.31	20.11.31	68 lbs.	8,840	1,768
Hickory Prior	...	19.6.31	26.6.31	25. 8.31	10.10.31	27.11.31	92 "	11,960	2,392
White Burley	...	25.7.31	1.8.31	2. 9.31	26.10.31	1.12.31	57 "	7,410	1,482
Dunbara	...	25.7.31	1.8.31	1. 9.31	14.10.31	1.12.31	52 "	6,760	1,352
Thattayan	...	25.7.31	1.8.31	31. 8.31	28.10.31	11.11.31	92 "	11,960	2,392
466 Burma	...	5.8.31	12.8.31	4. 9.31	14.10.31	30.11.31	52 "	6,760	1,352
Jaffna	...	16.8.31	24.8.31	16. 9.31	20.11.31	16.12.31	60 "	7,800	1,560
Deli	...	16.8.31	24.8.31	21. 9.31	24.11.31	16.12.31	60 "	7,800	1,560
Burmese Havana	...	8.9.31	14.9.31	9.10.31	20.10.31	26.12.31	65 "	8,540	1,690
Shwengyin	...	8.9.31	14.9.31	9.10.31	20.11.31	16.12.31	65 "	8,450	1,690
Bhengi	...	8.9.31	14.9.31	10.10.31	28.11.31	31.12.31	76 "	9,880	1,976

The eggs are laid mostly on the under-surface of the leaves and the newly hatched caterpillars, first mining into the leaf, reach the stem by way of the mid-rib. They pupate sometimes in the mid-rib when the leaves are large but generally inside the stem. Swellings are formed on the stems at the points where the pest is feeding.

Control measures consist in slitting with a clean, sharp knife the swollen portion of the stem and killing the caterpillar or pupa. All badly attacked plants should be burnt and after the harvesting of the crop, old tobacco stumps should be pulled up and destroyed with all other refuse from the recently harvested crop.

Diseases.

Damping-off.—This trouble, which is caused by the attack of a fungus in the seed beds, has been mentioned previously in this article and preventive measures have been suggested.

If young seedlings show signs of root or leaf diseases they should not be used for planting. It is advisable to remove them from the seed bed, along with the immediately adjacent, apparently healthy plants with which they have been in contact. Such plants should always be burnt.

Physiological Diseases.—The physiological distortions of the leaves which may occur when the plants are a few weeks old are usually attributed to deficiency of potash or available nitrogen, *e.g.* in the case of "frenching"—characterised by the production of narrow, fleshy leaves, from suckers arising in the axils of normal leaves—a dressing of nitrate of potash is an effective remedy.

Mosaic Disease.—This is a virus disease, which can be very infectious. The symptoms of ordinary mosaic are manifested on the leaves which become mottled by varying shades of light and dark green. In some cases, blistering and other malformations may appear. The disease attacks plants at all stages of growth, and can cause a reduction in the quantity and depreciation of the quality of the leaf.

Seedlings showing mosaic symptoms in the seed bed should be removed at once and burnt, care being taken not to handle healthy plants after handling infected plants since the disease is easily transmitted by the hands. Weeds, or plants belonging to the tobacco family (*Solanaceae*), should not be permitted to grow near tobacco plots. Field sanitation involving the destruction by burning of any plants which become infected and the removal and burning of old tobacco stalks is recommended.

Wilt.—This disease is also known as "slime disease". The leaves of affected plants wilt rather suddenly as a result of the plugging of the vascular system of the stem by bacterial slime. The responsible organism is a soil bacterium (*Bacillus solanaccarum*) which usually enters the stem through the roots. On cutting across an infected stem, the vascular system is found to be discoloured and in advanced cases a dirty white slime exudes in drops from the surface.

The trouble is not often serious on virgin land, but if tobacco is grown in the same soil continually, the percentage of infection increases each year and may cause considerable reduction in yield.

Crop rotation with non-susceptible crops (*e.g.* maize, beans) is essential, and it is advisable to sterilise the soil of seed beds by heat. This can be done by burning brushwood and grass on top of the soil. Only healthy plants should be used for planting and the roots should be injured as little as possible when transplanting.

Tobacco stems and crop refuse should never be buried on areas on which tobacco is to be grown. All such material should be burnt.

Frog-eye.—This is a disease of the leaves and is caused by a fungus (*Cercospora nicotianae*) which produces pale brown irregular shaped spots on the leaves. The older leaves are usually the first to show the infection. The attack is more severe during rainy weather.

The disease is not easy to control, but it does not, as a rule, do serious damage in the field.

Early removal of the lower infected leaves helps to remove sources of infection and tends to reduce the number of spots on the younger leaves.

AGRICULTURE IN BRUNEI

BY

H. A. TEMPANY,

Director of Agriculture, S.S. and F.M.S.

The State of Brunei comprises an area of 2,500 square miles and a coast line of about 100 miles.

It lies between latitudes $4^{\circ}2' N$ and longitudes $114^{\circ}7$ and $115^{\circ}22 E$. It is bounded on the western side by the State of Sarawak, and on the east by the territory of British North Borneo, and is divided into two parts by the Limbang Division of Sarawak which intrudes through Brunei to the sea at Rangan Slarow and separates the district of Temburong from the remainder of Brunei Territory.

It possesses an equable climate with a rainfall which ranges between 100 and 200 inches for different parts of the State.

It is well watered and traversed by four main river systems, *viz.* the River Brunei, the River Tutong, the River Temburong and the River Belait which give their names to the four principal districts.

The principal town is Brunei, situated 12 miles from the mouth of the Brunei River, consisting mainly of Malay houses built on "nibong" piles in the river, but also including a strip of mainland on which Government buildings, shop houses and private dwellings are erected. The other townships are Tutong and Kuala Belait; developments at the latter township are taking place rapidly as the result of the operations of the British Malaya Petroleum Company.

The country in general consists of level plains alternating with rolling country; at certain points in Temburong, Tutong and Belait hills of some height occur.

The soils of Brunei in the extensive alluvial plain consist of heavy clays and sandy clays; in the hill regions they are more sandy in character. The country is still to a large extent covered in forest.

Agricultural Population.

The population as enumerated at the 1931 census comprised 30,135 persons or 12 per square mile; it is, therefore, still very thinly populated. It comprised approximately 27,000 people of Malay race, 2,700 Chinese with 377 Indians and 60 Europeans.

The Malay races are stated in the census report to be made up approximately as follows:—

Bruneis	Kedayans	Tutongs	Belaits	Dyaks and Muruts
17,000	6,000	2,700	450	750

Of these the Kedayans and the Tutongs are best fitted for agricultural pursuits, being hard working and having a natural bent therefor. The Bruneis are fishermen, metal workers, weavers and so on, but, it is said, are showing an

SKETCH MAP OF THE STATE OF BRUNEI

Scale 12 Miles to 1 Inch

Miles 12 6 0 12 24 Miles

REFERENCE

- | | | |
|--------------------------|--|--|
| Metalled Road | European Rubber Estates | |
| Earth " | European Rubber Estates (area under Rubber) | |
| Road Along Sand Beach | Native Holdings (Miscellaneous Cultivation) | |
| State Boundary (assumed) | Oil Mining Lease (Brit. Mal. Pet. Co. Ltd.) | |
| District Boundary | Oil Prospecting Licence (Brit. Mal. Pet. Co. Ltd.) | |
| District Name | | |
| Residency | | |

BELAIT

Ry.

SARAWAK

SARAWAK

LIMBANG DIVISION

TEMBURONG

BELAIT

SARAWAK

BELAIT

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SARAWAK

increasing tendency to betake themselves to agriculture.

There are four European owned rubber estates; two of these are situated in Brunei district and two in Temburong district: the total area under cultivation in rubber on estates is stated to be 4,000 acres, while in addition there are about 5,000 acres under native rubber. The exports of rubber for 1930 were 870 tons and for 1931, 725 tons. For the most part, tapping has ceased on native holdings, though it is still continued on two out of the four European estates.

Apart from the four European estates, the whole of the agriculture in Brunei is in the hands of natives, and with the exception of rubber plantations which, as everywhere else in the Malayan region, has appealed to the natives by reason of the ease of the operations involved and the high returns which the industry formerly yielded, have consisted in the main in rather primitive operations for the production of food crops, particularly rice and sago, together with fruits, vegetables, poultry and meat required for the consumption of the community.

Agricultural Trade.

The exports of the country have comprised in addition to rubber, sago, jungle products, including particularly jelutong and cutch* for the extraction of which a small factory exists in Brunei town, dried fish, brass ware, silver ware, native textiles, together with small quantities of cattle, pigs, poultry and copra.

The value of imports and exports for the past three years have been as follows:—

TABLE I.
Imports and Exports of Brunei.

Year	Imports \$	Exports \$
1929	1,484,293	1,251,335
1930	2,536,422	807,449
1931	2,193,511	501,494

The vast disparity between imports and exports in the two years 1930 and 1931 is due to the operations undertaken by the Malayan Petroleum Company in opening up the oil field at Kuala Belait, and it is indeed fortunate for the State that these developments should have occurred at the present juncture, as they have served to mitigate to a considerable extent the effect in Brunei of the world depression.

It is noteworthy that among the articles imported are included the following which are capable of being produced locally:—

* A tanning material extracted from the bark of the mangrove tree.

TABLE II.

Imports into Brunei of Certain Agricultural Products.

Product.	Quantity.				Value \$		
	1929	1930	1931	How Stated	1929	1930	1931
Rice	27,754	54,370	30,515	pikuls	199,697	212,772	135,410
Milk	1,834	4,884	2,418	cases	21,642	30,198	26,389
Tobacco	79,841	91,694	80,941	lbs.	125,137	120,536	109,215
Coconut Oil	2,710	2,476	2,287	tons	15,187	12,283	8,710
Coffee	316	388	519	pikuls	14,346	11,848	10,789

The revenue and expenditure of the State for the past three years has been as follows :—

	<i>Revenue</i>	<i>Expenditure</i>
	\$	\$
1929	345,290	344,092
1930	333,069	379,604
1931	342,011	322,791

There is at present a surplus of \$170,737, while the public debt amounts to \$459,750. The principal sources of revenue are Customs, Monopolies and Land Revenue.

Up to the present, there has been no expenditure on agricultural services. It should, however, be noted that the Government has temporarily engaged the part time services of an unemployed Dutch planter who is raising plants for distribution to native cultivators.

Land Alienation.

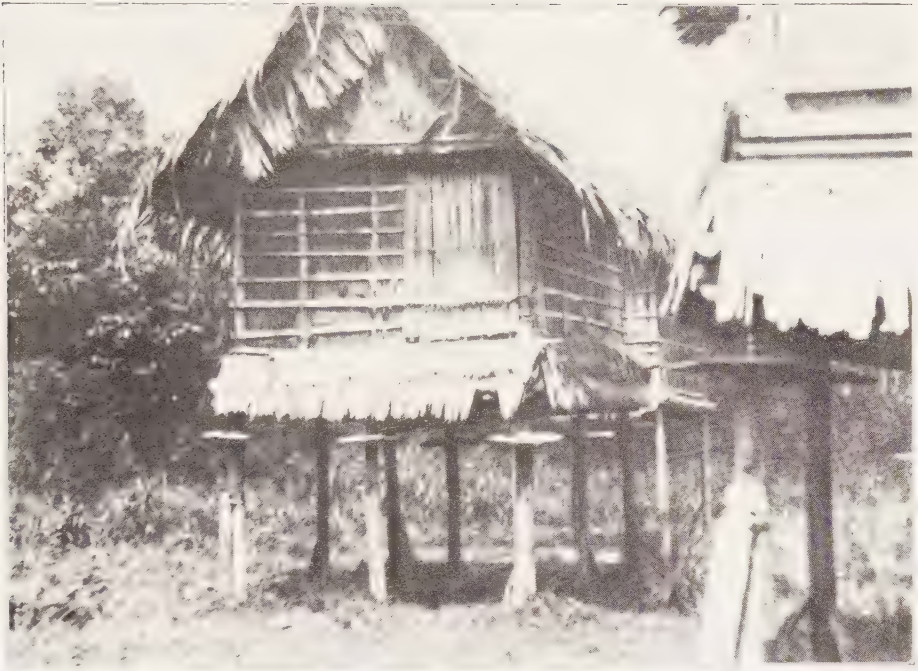
Alienated land at the end of 1931 amounted approximately to 74,900 acres, and there were 4,500 small holdings. Land is alienated by entry in the Land Office register, from which an Extract is issued as title following Malayan practice.

Land that has not been alienated is termed State land, and may be disposed of by the Resident under the Land Code, 1909, the procedure under which follows generally that which obtains in the F.M.S.

There is at present no Survey Department; surveys of alienated land being performed by prismatic compass.

Communications.

Until comparatively recently, communication was entirely by river or by jungle tracks, but latterly a programme of road construction has been embarked on, a road from Brunei to Tutong having been completed. A second from Brunei



A PADI STORE IN BRUNEI.
(Note precaution against entry of rats.)



A BRUNEI NATIVE HOMESTEAD
SHOWING PADI STORE IN REAR.

to Limbang in Sarawak is now practically complete, a third from Barakas Estate to the Coast is under construction, while there is a fourth from Bangan to Panderuan in Tembarang district; it is understood that the construction of other roads is contemplated in due course.

The effect which the programme of roading is likely to have on the agricultural development of the country is considerable; already there are abundant signs that the system of shifting "ladang" (dry land) cultivation which was formerly universal is tending to become replaced by permanent wet padi cultivation in the areas opened up by the road system, and both on the Tutong road and on the Limbang-Brunei road at Lumpas there are numerous holdings on which the making of permanent "sawah" has made considerable progress.

Rice Cultivation.

The writer was greatly impressed by the possibilities which exist for wet padi cultivation in Brunei; there are in all the localities visited very large tracts of land which appear admirably suited to it, provided they can be opened up; there are also in most localities sufficient areas of "permatang" land to permit of the formation of homesteads.

One is also impressed by the manner in which the Kedayan cultivators had cleared the land for cultivation, there being little signs of jungle stumps and partial cleaning such as is commonly seen in the opening up of new sawah areas. Some of the homesteads seen were also surprisingly good and well kept and might serve as a model for many that are met with in the Malay Peninsula.

It is stated that there are at the present time 7,400 acres under rice cultivation in Brunei of which 3,500 acres are under cultivation in "wet" rice, the remainder being in "dry" rice. The average yield is stated to be about 100 gantangs per acre all round, but from a consideration of the figures for rice imports and of the population it is probable that this may be an underestimation.

Individual yields as high as 500 gantangs per acre are stated to have been recorded, while 350 gantangs per acre are stated to be usual in favoured localities.

Selected strains of seed have been imported for two successive years from the Department of Agriculture, S.S. and F.M.S., and are stated to have given uniformly satisfactory results and to meet with appreciation from the cultivators.

The writer was able to see land preparation in progress at one or two points; methods employed are primitive, but the people themselves—namely Kedayans—are very painstaking and hardworking.

Dry seed beds are sown and the rice transplanted, land being prepared by trampling with buffaloes, the animals being yoked five or six abreast for the purpose. The formation of bunds is performed by means of the "changkol". Ploughing is nowhere practised, it would seem that if more thorough and systematic draining of the land was undertaken the introduction of more economical and efficient methods should be possible.

Future Development of Rice Cultivation.

The developments that are taking place as the result of the opening up of the country by means of new roads are of considerable significance and importance, and provided these developments are fostered and helped there is no reason why the country should not become self-supporting in the matter of rice production in a comparatively short space of time.

But to enable this to be achieved satisfactorily, considerable care and forethought will be necessary; the problems likely to arise will have to be foreseen and provided for and dangers guarded against.

One of the first requisites is that attention should—so far as possible—be concentrated on a small number of areas which should be so situated that considerable expansion is possible at a few parts rather than diffused over a larger number of small areas: this will tend to economy of effort and more efficient work. So far these requirements appear to be largely realised.

The second point is that attention should be given to improvement of agricultural methods including seed supply, cultivation, drainage and irrigation and control of pests. This necessitates some provision for agricultural services, and this must be regarded as essential if progress is to be achieved.

Irrigation for Rice Areas.

The question of the possibility and need for irrigation schemes naturally arises; the rainfall is on the whole heavy and well distributed, but the advantage of having some irrigation water available to supplement rainfall, if need be, is evident: conditions appear to be favourable to small scale irrigation projects which could be undertaken by the people themselves, and this question, as well as that of improving the drainage of the fields, will have to be kept in view.

Regulation of Rice Planting

A further point that will probably require attention is the need for provision that operations in relation to padi planting can, if necessary, be capable of official regulation, while powers will also be required to deal with possible outbreaks of disease. Titles for padi lands are at present issued with a clause providing for resumption of the land if unplanted for three years.

Economics of Rice Cultivation.

The economic side of rice cultivation will also require attention, and in this connection the possibility of the provision of some assistance to intending padi planters in the clearing of the lands should be considered.

A further point is the question of marketing of surplus padi and rice so soon as the production begins to exceed the consumption powers of the producers themselves, and the allied question of indebtedness.

Probably the most effective way to approach this and the allied problem of

indebtedness may be found to be the establishment of small supervised marketing groups and the provision, if need be, of Government controlled buying and selling agencies; if these are established the question of linking up the provision of credit therewith is an obvious further step.

It is understood that the Resident proposes, during the coming season, to establish buying centres for rice and padi in the three principal urban areas.

Rice is at present prepared in the native homesteads by the usual primitive process of pounding in a mortar by hand. The samples of prepared rice seen by the writer were very indifferent in quality with much broken grain. So soon as rice in commercial quantities becomes available for sale, the question of milling is bound to arise.

Mechanised Rice Cultivation.

A factor in the present situation is the interest which is being taken in rice cultivated by certain of the estates. Two estates are taking steps to induce Malay cultivators to take up rice cultivation on lands in their concessions with the object of attaching labour to the estates which will continue to be available if and when conditions in the rubber industry improve, and on one of these estates a considerable area has been cleared by Malay settlers for the purpose.

It is understood that the manager of the other estate is considering the question of undertaking mechanical rice cultivation in uncleared areas in the estate.

The idea is interesting and is no doubt the outcome of tendencies in the same direction which are said to be in evidence in Sarawak; in Limbang which adjoins and bisects Brunei, a Japanese company has, it is understood, obtained a concession from the Sarawak Government for the purpose of undertaking large scale mechanised rice cultivation, while in other parts of Sarawak one or more groups of Chinese are stated to have taken up land with a similar object in view. If these ventures show promise, the possibility of similar developments in Brunei may be expected to arise.

Padi cultivation has been considered at some length, as it appears to be the agricultural question of outstanding importance in Brunei at present, and the one on which the attention of Government should chiefly be focussed with a view to rendering the country independent of imported padi, but this does not preclude attention to other crops.

Miscellaneous Crops.

Obviously the planting of coconuts is capable of marked extension, while coffee also is capable of considerable expansion with a view to meeting local needs.

Attention should also be paid to the probability of a steadily increasing demand for meat, poultry, eggs, fresh vegetables and fruit as the development of the oil fields proceeds, and here Brunei and Labuan can very well compete.

Groundnuts, arecanuts and tobacco also are worthy of attention. There also appears to be a marked shortage of buffaloes, and attention to this point also would serve a useful purpose, while the improvement of poultry is also an important line.

In relation to the possibility of extension of estate agriculture, one is struck by the probable suitability of much of the undulating country for oil palm cultivation, and this view is strengthened by the fact since learned that an estate of about 1,200 acres under this crop has been established in Sarawak and is stated to be showing considerable promise.

The possibility in this direction in Brunei might well be tested out by experimental plantings at one or two points.

Organisation of Agricultural Services.

But for these developments to be achieved, the establishment of agricultural services seems essential; these should include the opening up of test and demonstration plots and plant distributing centres, and definite efforts in certain other directions, namely, the holding of periodical shows of agricultural produce, the organising of regional small-holding competitions, and the establishment of school gardens in connection with the vernacular schools of which there are now 10 in operation.

It is also suggested that attention might be directed to the feasibility of establishing district agricultural committees with a view to assisting developments on the lines adumbrated in one of the resolutions of the recent Inter-departmental Agricultural Conference.

It is probable that moderate expenditure in establishing services with these objects in view would fully recoup itself in due course.



DERRIS ELLIPTICA.

Showing immature pods.

Inset — mature pod and seeds (all reduced).

SEEDING OF DERRIS ELLIPTICA

BY

J. N. MILSUM,

Acting Agriculturist.

Under ordinary conditions of cultivation in Malaya, tuba (*Derris elliptica*, Benth.) rarely forms seed pods. Propagation is exclusively asexual and this fact may be a contributory cause of the failure to produce seeds. A further reason is that the plants are normally lifted from the soil when about two years old for the purpose of harvesting the roots. However, under local conditions, pollination is rarely accomplished and although numerous plants have been examined it is only recently that pods have been observed and seeds obtained.

During the middle of March 1931, several immature pods were noticed in a 4 acre block of two year old tuba under cultivation at the Government Experimental Plantation, Serdang. A number of pods failed to mature, but upon carefully examining the whole stand of plants in the following August, six pods containing several seeds were collected. A large plant climbing over a dead tree on land adjoining the Demonstration Station, at Kuala Lipis, Pahang, set a considerable number of pods estimated at about a thousand. These matured at the end of August, 1931, and provided the material for subsequent investigations.

The pods averaged 2.5 ins. to 1.75 ins. long, 1 in. broad and 2 ins. thick. Colour when mature, olive-brown turning dark brown. The majority of pods were one-seeded, while others contained two or, in several cases, three seeds. Actually 680 pods were examined and these were found to contain 985 seeds. The seeds are joined to the upper suture of the pods. Length of seed .5 in., breadth .3 in., flattened .15 in. thick; colour coffee-brown, deepening upon removal from the pod. Approximately 100 seeds weigh one ounce.

The seeds were sown in boxes of prepared soil and germination commenced ten days later, continuing for six weeks. A total of 25 per cent. germination only was obtained, since there were many unsound seeds sown. The seedlings were transplanted into bamboo joints and grown until sufficiently large to plant out in the field. The plants were examined a year after the seeds were sown and found to be making good growth. The majority were over two feet high with stems a quarter of an inch or more in diameter.

Since the propagation of *D. elliptica* is so readily undertaken from cuttings of portions of the stem, there is normally little necessity to raise plants from seeds. Moreover, owing to the rarity of fruiting under ordinary plantation conditions in Malaya, it is a matter of considerable difficulty to obtain seeds in any quantity. However, in view of present knowledge regarding the improvement of yield of the essential product in tropical crops as a result of selection, e.g. Cinchona, the possibility of developing clones of high toxic content is widened by the discovery that under suitable conditions, fertile seed of derris is produced.

The writer is indebted to Mr. J. Fairweather, Agricultural Field Officer, for forwarding the material from Kuala Lipis.

SAN BLAS COCONUTS IN MALAYA

BY

A. C. SMITH.

San Blas coconuts having been reported to be very high yielders, seed nuts were obtained from Panama in 1920/21 with a view to testing them in the Lower Perak District.

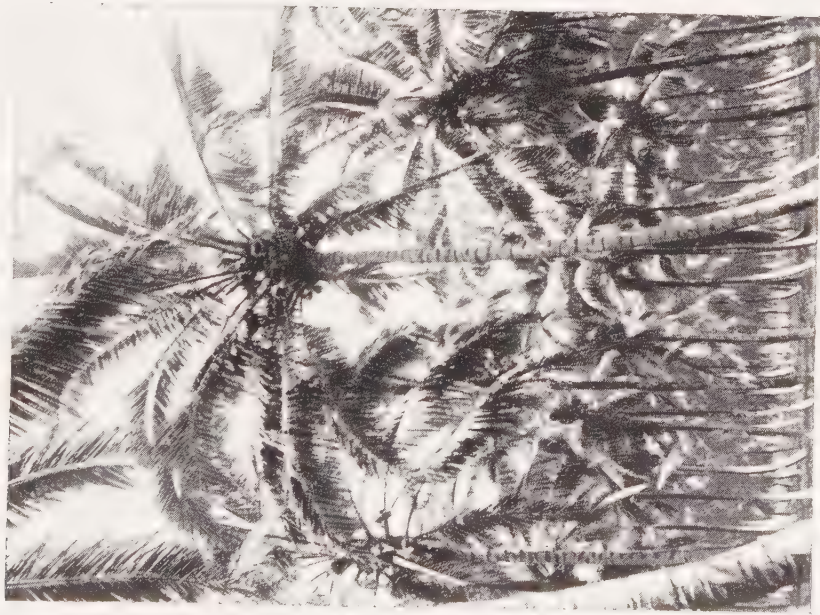
Some 200 seed nuts in all passed through the hands of the writer. Despite delays in transit, germination on the whole was good—about 80 per cent.—from which 150 seedlings were planted out. These were planted in alternate rows with the ordinary “tall” variety, care being taken that exactly similar conditions as regards soil and drainage applied in each case.

The first 50 were planted on low lying peaty soil, drained every fourth row (120 feet) by a 4 feet x 4 feet drain, with a 2 feet x 2 feet scupper drain in every row. The second 50 were planted in a block on and adjacent to the well known “sand ridge” which runs through the Bagan Datoh District from the Perak River to the Bernam River. The ridge outcrops at the spot to three or four feet above normal soil level, is almost pure white shell, and thus extremely well drained at all seasons. The third 50 were planted on a belt of very heavy yellow clay, also at a comparatively high level, with a water table of 3 to 3½ feet.

Initial growth in the first two batches was good, rather superior to that of the ordinary tall. Flowering was also slightly earlier. The third lot have all along been much behind the tall. This may be due to the heavy soil, or to the fact that they were the last to germinate, as it is frequently observed in estate practice with the ordinary tall that slow germination usually results in an inferior palm. Probably the poor growth is due to a combination of both factors.

The palm differs markedly in many characteristics from the tall. In general appearance it may be roughly described as midway between that and the green dwarf. The stem is slighter, measurements of 20 palms of each variety at six feet gave an average girth of 30.3 inches San Blas and 38.5 inches tall. From ground level to first leaf the San Blas averages between five and six feet shorter. On the other hand, the leaf is longer as is also the spadix. Twenty leaves averaged 23.1 feet in length compared with 21.2 feet in the tall, and 20 spathes averaged 48 inches against 38 inches. As will be seen from the illustrations, the palm can be readily distinguished from the tall apart from the difference in height. The chief characteristic on casual observation is the very open crown and the large number of leaves hanging more or less vertically. It is not exceptional to observe 12 green leaves hanging down the stem at almost 180 degrees. The spathes are much more open with longer branchlets and the female flower set further out from the spathe stem than is usual in the tall. It is not exceptional to see as many as three fertilised female flowers on a single branchlet.

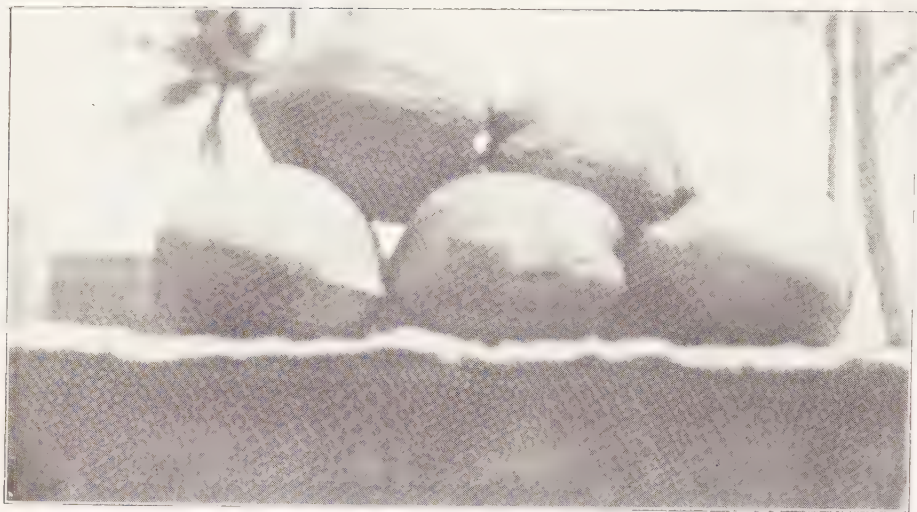
COMPARISON OF PALMS ON ADJACENT BLOCKS.



TALL PALMS 1920 PLANTING.



SAN BLAS PALMS 1920 PLANTING.



NUTS FROM TALL PALMS.



SAN BLAS NUTS FROM NEXT ROW TO TALLS SHEWN ABOVE.

The first flowering and nut setting was distinctly promising. Spathes carrying from 12 to 16 three-quarter developed nuts were frequently observed. This early promise, however, did not come to fruition; practically all the nuts fell before ripening commenced and there has been no improvement in this respect up to date. A count of the same 20 palms of each variety showed in the San Blas an average of 21 fertilised female flower, 32 nuts more or less fully developed but green, and slightly under 2 ripe nuts. The count for the talls showed 14 fertilised flowers, 21 fully developed nuts, and 9 ripe. These figures confirm the first impressions gained, that the San Blas is a more prolific bearer as far as actual number of fruits set is concerned. Why the premature nut-fall occurs is difficult to determine. That the cause is primarily physiological cannot be doubted. With the longer and more open spadix the bunch of 12—15 nuts appear to be at least as comfortably seated as any normal bunch on the tall variety, and there is nothing to indicate that excessive "squeeze-off" will occur. There is certainly lack of support owing to the drooping leaves, but it is rarely noticed that the spadix has fallen, or even become partly detached, at least not until the nuts are in a very forward stage of development. A peculiar feature is that even with nuts which ripen on the palm the husk invariably shrivels. Frequently cracks are observed and the general appearance is similar to nuts which have prematurely fallen from the tall variety and have ripened (or browned) on the ground, or like the more or less empty husk one sees on palms which have been abandoned in swamp or secondary jungle growth. This would indicate that the premature nut-fall is more due to physiological causes than to mechanical. A possible reason is that environmental conditions on the West Coast clays, with a high water-table, are quite unsuited to this variety, differing greatly as they must from the sandy seashore environment of their habitat.

The fruits differ greatly from those of the tall. In addition to the shrivelled husk mentioned above, they are almost without exception elongated, as will be seen from the illustration. The nut proper follows closely the shape of the whole fruit. Ten fruits from a row of San Blas and ten from the adjoining row of talls were collected for comparative purposes, one from each palm. All were as nearly as possible in the same state of ripeness and were carefully stored under identical conditions for three weeks prior to weighing and measuring. All were then perfectly ripe, and germination, except in the case of No. 3 tall, was nil. Measurements round each fruit longitudinally gave an average of 70.7 cm. San Blas and 69.6 cm. tall. The average girths were 57.5 and 63.5 cm. respectively. This emphasizes the ovoidal character of the San Blas. Another feature of these nuts is the very high husk percentage compared with the tall. This amounts to 43.7 per cent. of the whole fruit compared with 26.1 per cent. in the tall. These points are clarified by the following table.

Comparison of the San Blas coconut with the ordinary "tall" variety.

Palm No.	San Blas.				Tall.			
	Weight Grammes.			Thickness of meat mm.	Weight Grammes			Thickness of meat mm.
	Fruit.	Husk.	Wet Meat.		Fruits.	Husk.	Wet Meat.	
1.	1289	554	368	12.7	1770	390	554	11.1
2.	1261	512	335	13.5	1730	454	577	14.3
3.	2042	851	540	15.1	1873	794	454	12.0
4.	1872	821	381	12.7	1575	440	482	15.1
5.	1545	921	285	11.9	1460	350	468	13.6
6.	1375	667	310	11.1	1600	386	427	11.1
7.	1488	510	468	11.9	1475	347	460	11.9
8.	1248	567	327	11.0	2224	595	654	14.3
9.	1716	753	454	11.9	2015	335	456	15.5
10.	1448	527	397	12.4	1262	350	368	12.4
Average	1528	668	386	12.4	1698	441	490	13.1
% whole nut.		43.72	25.26			26.15	28.85	

It will be noted that in every San Blas nut husk far outweighs meat, whereas the reverse is the case with the talls except No. 3. This nut had a 3 inch "apple", a perforated eye, with the meat partially rotten.

Taking the dry copra content as 53 per cent. of the wet meat it would require 293 San Blas nuts per picul of copra against 232 of the talls. This latter figure is within one nut of a recent large scale test to determine the number of nuts required per picul from the block in question; the nuts under test did not include any San Blas. From casual observation one would fix the number of San Blas required at about 300 per picul.

Conclusions.

Although the San Blas coconut has the reputation in Central America of being an extremely prolific yielder, it would appear that it is not suited to the heavy alluvial clays of the West Coast of Malaya. Both in number of nuts harvested per palm per annum, and in copra content, it is far below the ordinary Malayan tall variety.

Abstract.

THE PRODUCTION OF ESTATE RUBBER IN NETHERLANDS INDIA DURING THE FIRST HALF YEAR 1932.

Abstract from Landbouw, Economisch Weekblad, 21 October, 1932.

On the 30th of June 1932, 255,904 acres of estate rubber were out of tapping; this is equivalent to 27 per cent. of the potentially productive area in existence on 31st December, 1932.

The yield per acre per month of the productive area increased considerably, rising from 32.90 pounds in December 1931, to 36.92 pounds in June 1932.

In 1931 production during the first half year was 81,863 metric tons; in 1932 during the same period, it was 79,982 metric tons. Production during the second half of 1932 is expected to be much smaller and the total 1932 production will probably not exceed 149,331 metric tons, equivalent to 78.3 per cent. of a potential production of 190,636 metric tons; whereas for 1931 it was 165,799 tons, equivalent to 90.9 per cent. of a potential production of 182,338 metric tons.

Comparison of the first halves of the years 1931 and 1932 shows a decrease of 27 per cent. of productive area and a decrease of only 2.3 per cent. of actual production. This is due to a combination of contributory causes which it would be hard to estimate at their true value separately. The decrease of area in tapping has of course been gradual. The least productive fields have been the first to be taken out of tapping. Young fields that have reached tappable age have not been put into tapping, as such practice would not now be economically sound. More drastic tapping systems are, in many cases, operative at the present time on the generally more highly productive areas which are still being tapped. The general policy of those estates that have not yet closed down is to reduce the cost per pound by confining their operations to the most remunerative fields, while reducing expenditure—general as well as specific—to the absolute minimum. This policy has, on those estates that are still tapping, increased the average yield per month per acre from 37.72 pounds in January 1932 to 39.33 pounds in June 1932.

The total area newly taken into tapping since 31st December, 1931, was 17,483 acres on the estates which were still in tapping on 30th June, 1932, whereas on 9,768 acres of the above estates tapping was stopped.

On the estates on which the area in tapping remained unaltered, production increased by an average of 3 per cent. for the whole of the Netherlands Indies, but in Java and Madura alone the average was 8.5 per cent., the most probable cause of this increase being the re-introduction of more drastic tapping systems.

On some estates, part of the tappable area is now being tapped heavily. In January 1932 this was the practice on about one-third of their total area,

i.e. on 22,457 acres out of 72,812 acres. In that month the average production of these estates was 35.67 pounds. In June the figures for these same estates were respectively 13,613 acres, 39,497 acres and 38.70 pounds. If a total is taken of all estates on which, in June 1932, a part of the area was being tapped heavily, the figures are respectively 21,978 acres, 52,819 acres and 39.86 pounds. This yield figure is only little more than that of the average yield of all estates still working on 30th June, 1932, which was 39.33 pounds per acre.

In 1926, 81,204 acres were planted. Under normal conditions the whole of this area would have been put into tapping during the first half of 1932, whereas, considerably less than half of this new area was actually being tapped on 30th June 1932.

MALAYAN AGRICULTURAL EXPORTS, SEPTEMBER, 1932.

PRODUCT.	NET EXPORT IN TONS.				
	Year 1931	Jan-Sept. 1931	Jan-Sept. 1932	September 1931	September 1932
Arecanuts ...	19,266	14,794	15,441	1,718	1,826
Coconuts fresh ...	10,468	6,165	89,970†	840	6,726†
Coconut oil ...	9,909	7,412	8,132	772	812
Copra ...	100,809	70,828	65,951	10,054	10,772
Gambier, all kinds ...	2,563	1,924	2,404	160	301
Palm kernels ...	726	411	843	87	91
Palm oil ...	4,574	2,754	5,398	440	851
Pineapples canned ...	59,457	47,116	54,464	1,782	3,735
Rubber ...	434,857	318,928	305,511	36,833	33,315
Sago — flour ...	5,608	1,999	6,562	538	1,336
" — pearl ...	2,429	1,608	2,136	200	248
" — raw ...	2,904*	1,451*	3,028*	311*	332*
Tapioca — fresh ...	9,742	7,699	7,193	679	868
" — flour ...	491*	109*	191*	85*	1*
" — pearl ...	19,006	14,322	15,371	1,568	1,459
Tuba root ...	74	44½	98	3½	15

† '000 in number.

* net imports.

Reviews.

Insects of Coconuts in Malaya.

By G. H. Corbett. *Department of Agriculture, F.M.S. and S.S. Special Bulletin, General Series No. 10, 106 pp. 19 plates. Price \$1.50 (interleaved \$2) post free.*

The planter frequently experiences some difficulty in using a scientific reference book by reason of lack of knowledge of the system of classification employed and the large number of technical expressions and words used therein.

On the other hand, the so-called popular books of reference on scientific subjects are equally difficult to use, because of the lack of method of presentation.

It is obvious that no reference book on such a subject, for instance, as entomology, can be really useful without following the recognised system of classification of insects, but it should not be beyond the wit of man so to modify the system to present needs, and to avoid or explain fully any technicalities, as to render the book intelligible to the general reader.

The Bulletin under review is a successful attempt to supply to the coconut planter a book of reference concerning the insect pests of coconuts.

In order to make the scheme of this work clearly understood, the first four pages are devoted to a simple exposition of the characteristics of insects upon which the classification is based. The following five pages contain a key to the insect pests of coconuts, with page reference numbers to the full accounts contained in the body of the book.

A glossary of entomological terms is added which will enlighten the reader on the meaning of terms which, although perhaps in every-day use amongst entomologists, are not generally understood by the uninitiated.

With a little practice, it should be a simple matter to identify any of the, at present, known insect pests of coconuts and to obtain from this book a complete account of the life history of a pest, and methods recommended for its control.

The illustrations, two of which are in colours, are excellent and should prove a great aid to the reader.

While this book is concerned with the insect pests of coconuts observed in Malaya, it is probable that it will be of almost equal value to coconut planters in other countries. A most comprehensive account is given of the major and minor pests of the coconut palm and this work may therefore be recommended as deserving the most careful attention of planters to whom it should prove of great utility.

D. H. G.

The Export Crops of the Netherlands East Indies in 1931.*

Bulletin No. 104 of the Central Bureau of Statistics, Department of Agriculture, Industry and Commerce, Batavia, September, 1932, pp 220, Price 6 shillings.

Comprehensive reviews of the export crops of Netherlands India in 1929 and 1930 will be found in previous numbers of the *Malayan Agricultural Journal*.* In these reviews, it was shown that Netherlands India is an exporter of a wide range of tropical agricultural produce. The 1931 report proves that the country has fully maintained its position in this respect. Of total world exports in 1930, the Netherlands Indies supplied the following percentages: Cinchona 94, kapok 73, pepper 69, rubber 35, copra 29, agave 22, tea 17 and sugar 10.

In 1931, production and exports were well maintained for most products, although, as was to be expected, the export values declined considerably. The total export value of agricultural products in 1931 amounted to 507 million guilders as compared with 859 millions in 1930 and 1083 millions in 1929. Exports of native production amounted to about one-third of the total.

Production of the principal native foodstuffs—rice and maize—show a slight decline over the figures for 1930, as does also tapioca. It must be remembered, however, that the Javanese native has for many years produced a very large proportion of his requirements of foodstuffs, while the number of export crops grown by him renders him much more independent of price fluctuations and slumps than is the case with the native in Malaya, who is more dependant on imported foodstuffs and who has a smaller range of agricultural products to which he can turn to provide himself with money. The effect of a low price for the export of food products probably is that the Javanese native, while ensuring his own supplies, is less inclined to cultivate an area sufficient to enable him to have an exportable surplus.

This statistical publication gives clearly the position of the Netherlands Indian agricultural exports for the past five years. While the explanatory sections are in the Dutch language, all table headings and sub-headings of tables are in both Dutch and English so that the English reader, without a knowledge of the Dutch language, may easily obtain from this record the salient points regarding the production and exports of agricultural crops from this most important world producer.

D. H. G.

* A review of the 1930 Export Crops (Bulletin No. 97) was published in the *Malayan Agricultural Journal*, Vol. XIX, No. 12, December 1931.

Miscellaneous Article.

CONDITIONS ON SMALL RUBBER HOLDINGS IN MALAYA.

Third Quarter 1932.

Rainfall.

In July, throughout the greater part of the Peninsula the weather was dry, with the exception of northern Kedah, where rain was well distributed: in the Seremban and Port Dickson Districts of the Negri Sembilan and in parts of Johore and Singapore, the weather was showery.

During the first half of August the rainfall was very slight while wet weather was general in the second half of the month, with the exception of Kedah, Pahang and the Tampin District of the Negri Sembilan, where the weather throughout the month remained dry. Similar conditions obtained during September, when again the first half of the month was dry in most localities and the second half showery. In Penang and Province Wellesley, however, the whole month was abnormally wet, 8 inches of rain falling in 48 hours on the 22nd. and 23rd. causing floods in many areas; the Krian District of Perak also experienced very heavy rain on the same date.

Prices.

A table is appended in which is shown the range of prices for small-holders' rubber among local dealers, together with the average monthly Singapore price for standard sheet and the prices quoted at the end of the month by the large dealers, which are included for the purpose of comparison with these local dealers' figures. All quotations are given in Straits dollars and cents for the price per picul i.e. 133½ lbs.

It should be added that these quotations show the range of prices over a large number of buying centres, in many of which such factors as transport and local competition necessarily affect the prices paid to the small producer.

Tapping.

The slight rise in the market price of this commodity which occurred in August, produced an immediate reaction among a large number of Malay-owned small holdings throughout the Peninsula which had previously been rested, causing their owners to renew tapping work. The District of Johore Bahru was the sole exception to this, as report states that a resumption of tapping was not general in this District in areas which had been left untapped for a considerable period. It is reported from the Negri Sembilan that the area out of tapping at the end of the quarter was 12,500 acres as compared to 20,000 acres at the end of the previous quarter; this figure, it should be added, applied only to Malay-owned holdings up to about 15 acres in extent.

The period of comparative idleness in the padi fields, between transplanting and ripening, which occurred in many districts during the quarter, has also doubtless been a contributive factor to this increase in tapping, as it has caused the release of much labour hitherto absorbed by the work of padi planting.

There has been notably less response to the enhanced price of rubber among the Chinese and Chettiar-owned holdings of larger area, only a minority of which resumed tapping operations. In parts of Selangor, several such holdings of larger area which had been reopened during August, were rested again as soon as the price of rubber dropped to below \$12 per picul.

There does not appear to have been any noticeable increase in the rate of excision during the period of improved prices, no cases of twice daily tapping or a multiplicity of new cuts on the trees have been observed; early morning tapping by torch light has still been noticed in some of the Districts where this had become a common practice.

From road-side observations while travelling between Kuala Lumpur and Taiping during the early part of September, the writer noticed that in most instances where trees had recently been newly opened, the tendency was to tap at within from two to four feet from the ground over old renewed bark, rather than to open up virgin bark, wherever any such existed, higher up the trunk. There was quite noticeable evidence of selective tapping, more especially in the Chinese-owned holdings of slightly larger area in the Kinta District of Perak, where many trees were left resting.

Although it would appear from superficial road-side observation, that the number of holdings in tapping had decreased again slightly towards the end of the period under review, at the same time, by far the majority of the Malay-owned holdings of small area, which had recently resumed tapping, have not again discontinued it owing to the later set back of the market, but appear to be carrying on under the impulse of a certain optimism.

Bark Consumption Records.—The investigations of the rate of bark consumption, bark reserves and yields of rubber on ninety small holdings throughout the Peninsula are being continued: on a total of forty-one of these holdings the twelve consecutive monthly records have been received. Out of the ninety holdings, fifteen had temporarily discontinued tapping operations during the period of investigation, six of which resumed work during the current quarter. Whenever possible, further measurements will be taken on these holdings until twelve month's records are obtained. Since it was found impossible to commence these observations simultaneously throughout all the States, a further forty-nine series of records remain to be completed, the last of which will not be received until March 1933.

Postponement or acceleration of bringing young rubber into tapping.—A report from Johore states that changes in market conditions have not led to the opening up of any of the young rubber still preserved intact, which in more prosperous periods would have already been considered suitable for tapping. One is inclined to believe that, generally speaking, the above might apply equally

to conditions prevalent in almost every part of the country.

Disease.

Mouldy Rot.—An increase in the incidence of this disease, concurrent with the wetter weather towards the end of the quarter, was reported from almost every District in which this disease has already established itself. Reluctance to enforce too rigorously the regulation procedure for its treatment among the impoverished small-holders has led, of necessity, to the spread of mouldy rot disease in some areas.

Pink Disease.—Slight outbreaks of this disease were found in a few localities in Kedah, Pahang, Selangor and southern Perak, but in each case little or no damage was incurred, the attack being speedily and adequately controlled.

Root Diseases.—There has been nothing worthy of comment to add with regard to root diseases during this quarter.

Oidium Heveae.—This disease has been observed to occur in a mild degree over wide areas in the Negri Sembilan, although its effect has been almost negligible.

Grades of Rubber Made.

The small-holder, in this as in the previous quarters of 1932, still favours the preparation of unsmoked sheet, the minimum time being allowed to elapse between its manufacture and sale. It is this urgency for ready cash which has doubtless led to the practise, in one area in the Muar District of Johore, of selling latex at 1 cent per kati (1½ lbs.) to the local Chinese dealers who themselves prepare sheet from it. The output of unsmoked sheet was 80 per cent. in Perak Central, and 75 per cent. in the Negri Sembilan.

The manufacture of slab rubber is now practically confined to the Krian and Taiping Districts of north Perak; its preparation in the coastal Districts of Selangor has almost entirely ceased.

Tendency to abandon Rubber Cultivation for Alternatives.

The cutting out of a few small areas of rubber in order to make room for the development of other standing crops such as fruit trees and coconuts, has been observed for the first time in the Muar District of Johore and in a part of the Dindings. At Bukit Chenggang in Kuala Langat, Selangor, an area of one hundred acres of two to three year old Chinese-owned rubber has been cut out in order to make room for the planting of pineapples.

The continued felling of a few rubber trees in isolated instances has been observed in other parts of Selangor and in Perak, Kedah and the Negri Sembilan.

It should be emphasized that in spite of the fact that in the reports on each preceding quarter of 1932, mention has been made of the cutting down of small numbers of rubber trees, with very few exceptions, it has only been observed to occur either among trees of poor growth and yield, trees interplanted with

coconuts or fruit, or in order to make room for small patches of food crops in localities where no other land is available to the small-holders for the planting of such crops. In view of the present extremely small scale on which such excision has been observed, it is unlikely to have become a factor which will in any way influence the output of rubber in the near future.

Figures of planting distances have been received from the Agricultural Field Officer, Pahang; the measurements were made on a total of 360 small holdings distributed throughout the State, a summary of which is as follows:—

<i>Planting distances.</i>				<i>Stand per acre.</i>		<i>Percentage of total 360 holdings observed.</i>	
From	8 x 8 feet	to	10 x 10 feet	From	681 to 436 trees	3	
..	10 x 10		13 x 13	..	436 .. 258	20	
..	13 x 13		15 x 15	..	258 .. 194	21.6	
..	15 x 15		18 x 18	..	194 .. 134	36	
..	18 x 18		20 x 18	..	134 .. 121	9	
..	20 x 18		20 x 20	..	121 .. 108	8	
..	20 x 20		23 x 23	..	108 .. 82	2.4	

Table of Rubber Prices.

3rd Quarter 1932.

	Singapore Standard sheet Average	Singapore for small holder's rubber at end of month	Penang for small holder's rubber	Kedah	Province Wellesley	Perak	Selangor	Negri Sembilan	Malacca	Pahang	Johore
JULY											
Smoked sheet.	7.18	7.30	—	4.50-7.50	5-6.50	3.90-7	4.90-7.60	4.50-9	5-7	4-6.60	4-7
Unsmoked sheet.		6.50	4.50-5.50	—	4.80-5.75	3-6	3.80-5	3-7.50	4-5.50	3.75-5.90	4-6.50
Scrap		3	—	—	1.80-3	1-4	1-2.50	1-2.50	2-3	1-2.80	1-3
AUGUST											
Smoked sheet	9.80	9.20	—	5.30-8.10	7-10.50	6-10	7-9.50	5.50-11	7-10	6.50-9.30	5-9.50
Unsmoked sheet		7.70	7.80-8.60	4.60-7	6-9	5-9	6-8	4.40-9	5-9	5.50-8.20	5.50-8.50
Scrap		3	4-5.50	3-4.50	2-5	1-5.50	2.50-4	1.50-4.50	2-5	2-4.70	1-4.50
SEPTEMBER											
Smoked sheet.	11.17	9.75	—	10-12	8.50-13.20	8-12.50	8-12	8-13	9-11	7.50-12.50	7-12.60
Unsmoked sheet.		8.50	8-13	8.50-10.80	7.50-13	6-11.50	7-10.50	6.50-12	7-9.50	6-11.90	6.50-12
Scrap		3.40	5-6	4.25-6	3-6	1-6	1-4	2-6	3-4	2.50-6	2-6

Departmental.

FROM THE DISTRICTS.

The Weather.

The weather during October was wet with strong winds in most parts of the Peninsula. An unusually heavy rainfall for this month with attendant floods was experienced in the Settlement of Penang, north Perak and Selangor. On the east coast of Pahang, however, the rainfall was lower than it was inland, while the eastern side of the Negri Sembilan and Port Dickson District, together with Kluang and Kukub areas in Johore, experienced fairly dry weather with some heavy showers; in Singapore island there were high winds but little rain.

Remarks on Crops.

Rubber.—The price of rubber remained about the same as that ruling during the latter part of September, but showed a decline on the average figure for that month. Price ranges for rubber produced on small holdings were: for smoked sheet \$6.00 to \$11.50, for unsmoked sheet \$4.00 to \$10.50 and for lower grades \$1.00 to \$6.00 per picul. In Singapore the corresponding average prices were \$9.30, \$8.15 and \$3.00 per picul.

In spite of this decline the general tendency has been for tapping to be undertaken on a larger proportion of small holdings, owing to the completion of padi planting operations in many Districts. Rain in the mornings, however, interfered with tapping on several days during the month in many parts of the country.

Mouldy Rot became very prevalent and difficult to control, while Pink Disease also reappeared in south Perak.

Padi.—The price of padi remained virtually unchanged, ranging from about 6½ to 15 cents per gantang in different parts of the country, and averaging about 9 cents per gantang, though the price at the Government mill at Bagan Serai was \$1.80 per picul or about 7 cents per gantang.

Lack of sufficient water in much of the coastal area and on the higher land in the interior of Kelantan still delayed transplanting. The seedlings in the nurseries which were badly damaged by drought were recovering, but will take a considerable time to become established after transplanting, so that much of the crop will be late.

Planting was practically completed in Kedah, the Settlement of Penang, and central Perak and was progressing well in north Perak and the coast of Malacca. In Krian the south eastern portion has a well established crop which gives promise of a good harvest. In the north western area, water shortage has resulted in irregular planting which will probably not be finally completed before the end of November and is likely therefore to lead to a late harvest in wet weather.

In Kuala Selangor District, more especially in the new areas, clearing work continued and nurseries were sown, but the latter were rather severely damaged by rats which were numerous and difficult to control owing to the presence of much timber on the land.

The crop in Pahang was promising and harvesting had commenced in a few places. Much of the crop should be safely reaped before there is danger of damage by floods.

In Johore the harvest was completed in Batu Pahat District and was in progress in several other places. Rats, birds and the padi-ily, *Leptocorisa acuta*, did some damage.

The Department of Drainage and Irrigation has, during the year, been carrying out a programme for the examination of several potential areas of padi land in the various States and Settlements with a view to the possibilities of providing water supplies and drainage. Such areas are also being examined by officers of the Department of Agriculture who take soil samples for analysis in order to ascertain if the land is suitable for padi planting. During October samples were obtained from the Merlimau Forest Reserve on the boundary of Malacca and Johore. Arrangements were also made for obtaining samples from a considerable area along the Triang river near the Negri Sembilan boundary in Pahang, from Serandu near the town of Pekan on the east coast, from the Duyong area in Malacca and from the Ayer Hitam area in Johore.

The revised scheme which has been approved for draining the Bachang and Tanjong Minyak swamps near Malacca town will add about 3,000 acres to the available padi land, besides improving an undetermined area of existing padi fields.

Coconuts.—The yields of nuts were reported to have decreased considerably in Kelantan, the Settlement of Penang, Perak and Selangor. This decrease is probably seasonal.

The export of nuts from Temerloh to Kuala Lipis in Pahang, referred to last month, has continued and it is hoped to open a trade between Temerloh and Bentong if suitable freight charges can be arranged.

In the Kuala Langat District of Selangor a number of Javanese are manufacturing coconut oil from their own nuts. The oil is either sold in the local fair or used for home consumption. The average price obtained is 14—16 cents per kati, and since only 4 or 5 nuts are required to make a kati of oil, the undertaking appears to be profitable, the local price for fresh nuts being only \$1.50 to \$2.00 per hundred. In east Pahang oil is also prepared locally and sold at 16 to 20 cents per bottle.

The number of Malays who prepare their own copra is increasing steadily in Selangor and the Bagan Datoh District of Perak. In Province Wellesley South one improved kiln has been erected by Malays and others are contemplated. Arrangements have also been made for the erection of one kiln of improved type in each of the Districts of Muar, Batu Pahat and Kukub in Johore.

This movement in Selangor has caused increased competition among buyers with a consequent rise in the local price of copra, more especially as a few Malay producers are now selling direct to European buyers in Klang District.

The general range of local prices for small-holders' copra showed a slight decrease on that of the previous month at \$3.50 to \$5.75 per picul.

Pineapples.—The fruiting season has again commenced with the result that four canning factories were working in Singapore island and five in Johore. Fruits from Selangor were being sent direct to Singapore where they were sold at \$3.00 per 100. A good crop of fruit was ripening in Klang and Kuala Langat Districts.

Fruit.—The main fruit season on the east Coast appears to differ considerably from that elsewhere, since in Kelantan there were heavy crops of mango-steen, rambutan and langsat, and durians were still plentiful, while durians and mangosteens from Trengganu were on sale at Kuantan.

In the same month in Selangor it was reported that durians and mangosteens were flowering and good crops of rambutans and pulasans were setting. In most of the western areas these fruits have recently set or are not more than half grown, although dukus were still being harvested in quantity in the Muar district of Johore.

Mangoes and horse mangoes were fruiting in Province Wellesley and green mangoes were on sale in Pahang east.

PENANG. *Gluor Padi Test Station*.—Final planting of the main crop was commenced, but before it was completed the whole padi area at Bagan Lepas was flooded as a result of continuous rain and the breaking of the banks of a stream. The floods were the worst experienced locally for 20 years and had not subsided sufficiently at the end of the month to enable an estimate to be made of the damage done.

Planting was completed at the great majority of the Padi Stations and Test Plots, except the new station at Panchang Pedena and the two new plots at Sungei Haji Durani and Tanjong Karang in Kuala Selangor District. At all of the latter, nurseries were sown, but at Panchang Pedena and Tanjong Karang the seedlings were damaged by rats which were plentiful in this newly cleared land and difficult to control. Harvesting was in progress on the two inland plots at Kuang and Kajang in Selangor.

A supply of budded citrus stocks from South Africa was received and distributed to several of the Agricultural Stations.

CAMERON HIGHLANDS. *Tana Rata Experimental Plantation*.—An additional area of 2½ acres was planted with tea. This forms part of an area of 3 acres on which an experiment to compare the yields of seven different "jats" is being laid down. Work on the pruning and manuring programme continued.

Two plots for certain experiments with potatoes were planted.

A sample of Kents Arabica coffee was prepared and sent to the Malayan Agency for a trade report.

Two orange bushes started to set fruit for the first time and others were flowering.

Village Fairs.

During October fairs were opened for the first time in a further 11 centres in Province Wellesley, Negri Sembilan, Pahang East, Malacca and Johore. In the Rembau District of Negri Sembilan stalls at the fairs are held by Malays only. At a meeting of headmen in Kuala Pilah District the majority were in favour of confining the stalls at fairs in that District to village Malays, but there was considerable difference of opinion on this point. Up to the present there has been an increasing tendency for retail shop-keepers to predominate as stall holders in the weekly fairs in this District.

Instructional Activities.

A party of headmen was conducted over the Pasir Puteh Padi Station in Kelantan on October the 27th and shown the work in progress on manurial and varietal trials.

In Selangor a number of small-holders who have cut out some of their rubber trees to plant vegetables complained that they were unable to grow satisfactory crops on such land. Consequently, a small plot was laid out on old rubber land in Klang District to demonstrate the necessity of using manures for the successful cultivation of food crops and vegetables on such lands. The manures were carefully chosen as being suitable for use by small-holders.

On the 12th. of the month students from the School of Agriculture visited the coconut area of Klang and Kuala Selangor Districts in order to obtain an idea of the copra work in progress. The party was given a simple lecture on the manufacture of copra and shown the details of the two experimental copra kilns at the Coconut Station, Klang. This was followed by a demonstration of copra baling and a visit to several of the local kilns, so that the differences and faults in design could be pointed out.

Poultry Diseases.

At the meetings of copra producers held during the last three months in the west coastal Districts of Johore, the incidence of poultry diseases among village fowls was brought to the notice of all attending. Arrangements have since been made by which subordinate agricultural officers submit regularly returns giving details of the presence of disease in their districts and the seasonal conditions experienced during the month. No outbreaks of disease were reported during October.

DEPARTMENTAL NOTES.

Copra Production on Small Holdings.

Following the recommendation of the Inter-Departmental Agricultural Conference last August, the training of the first Malay Copra Inspector commenced in September. When trained, this officer will advise Malay small-holders on subjects connected with the production of copra, in order that — by turning out a better grade product — they may obtain higher prices.

The enthusiasm amongst Malay small-holders in some districts to prepare and market their own copra has made it difficult for the Department to give sufficient supervision to the initial arrangements for preparing copra. In consequence, there is a tendency for the Malays to repeat the errors of the Chinese copra producers, and to erect kilns far too large for their individual requirements.

Chemical Investigations.

Experimental work on the production of palm oil, carried out in the experimental factory, Serdang, which has been one of the major activities of the Chemical Division for many months, was continued. Tests of the comparative efficiency of the Stork press and the centrifugal extractor indicated that the percentage of recovery of oil is almost identical with both methods.

Among the other numerous activities of this Division were investigation in the feeding values of sweet potatoes and soya beans, the rate of reduction of the oil content of various oil seed meals on storage, and estimation of rotenone and other toxic substances present in tuba root.

ANNUAL REPORT OF THE DEPARTMENT OF AGRICULTURE, S.S. AND F.M.S., FOR THE YEAR 1931.

*(Published as Supplement to the "F.M.S. Government Gazette"
of July 29, 1932.)*

CORRIGENDUM.

In the first paragraph on page 3 of the Report

for the words "AREAS UNDER RUBBER IN MALAYA.—The total area under rubber in Malaya for 1931 is estimated to be 3,076,645 acres. Of this total area 1,412,549 acres is estimated to be in production; the remainder is immature rubber."

read "AREAS UNDER RUBBER IN MALAYA.—The total area under rubber in Malaya for 1931 is estimated to be 3,076,645 acres. Of this total area 1,412,549 acres are estimated to be in production on estates of 100 acres or over, while the total area of rubber which has reached the tappable age is approximately 2,556,000 acres.

Statistical.

MARKET PRICES.

October, 1932.

Rubber.—The Singapore price of rubber smoked sheet equal to London Standard in October varied from $8\frac{1}{4}$ cents to $6\frac{15}{16}$ cents per lb., the average for the month being 7.47 cents as compared with 8.38 cents in September. The average London price was 2.25d. per lb. as compared with 2.71d. in September, while the New York average price was 3.66 gold cents per lb. as compared with 3.77 gold cents in the previous month.

Palm Oil.—The price of palm oil, c.i.f. Liverpool, on a basis of 18 per cent. f.f.a. was quoted throughout the month at £18.10.0, with a steady market.

Copra.—The market in Singapore has continued steady, fluctuating during October from \$5.60 to \$5.80 per picul. The average prices per picul for the month were as follows:—Sundried \$5.75, mixed \$5.20, as compared with \$5.76 and \$5.27 respectively in September. Copra cake has been quoted throughout October at \$2 per picul.

Coffee.—Singapore prices of Palembang coffee have varied but little throughout October, the average price being \$19.56 per picul as compared with an average price of \$19.30 in the previous month. The average price of Sourabaya coffee was \$24.19 to \$26.50, the price within this range depending upon quality.

Arccanuts.—Palembangs have been steady, the average Singapore price for October being \$2.99 per picul as compared with \$2.98 in September. Bila Whole averaged \$3.24 per picul as compared with \$3.18 in September. Average Singapore prices per picul of other grades in October were:—Splits \$4 to \$7.25; Red Whole \$5.19 to \$5.87; Sliced \$6.37 to \$7.37, the price within each range depending upon quality. Kelantan Splits were unquoted.

Rice.—The following are the average wholesale prices per picul of rice in Singapore during September: Siam No. 2 \$3.86; Rangoon No. 1 \$3.55, as compared with \$3.88 and \$3.60 per picul respectively in August.

The average retail market prices in cents per gantang of No. 2 Siam rice in September were:—Singapore 30, Penang 30, Malacca 27 as compared with 28, 31 and 28 respectively in August.

Gambier.—Singapore market featureless; prices shewing a tendency to decline. Average prices were: Cube No. 1 \$10.94 per picul and Block \$6.37 per picul, as compared with \$11.90 and \$6 per picul respectively in September.

Pineapples.—Enquiry for the United Kingdom has been small. An adjustment of the Import Duty into Canada has revived the demand for Malayan pineapples and a fair business has been done for that market. Average Singapore prices per case in October were: Cubes \$3.07, sliced flat \$3.01, sliced tall \$3.42, as compared with \$3.18, \$3.38 and \$3.50 respectively in September.

Tapioca.—Singapore market has been quiet. Average prices per picul in October were:—Flake fair \$3.32, Pearl seed \$4.04, Pearl medium \$4.14. Corresponding prices in September were \$3.33, \$3.98 and \$4.17.

Sago.—Demand in Singapore has been good, resulting in firming of prices. Average prices per picul in October were:—Pearl small, fair \$4.15, Flour, Sarawak, fair \$2.27, as compared with \$4.27 and \$2.27 respectively in September.

Mace and Nutmegs.—Are in poor demand. Average Singapore prices of mace in October were:—Siouw \$64 per picul as compared with \$64 in September: Amboina \$41.25 per picul as compared with \$43.60 in the previous month.

Nutmegs 110 per lb. \$24, and 80 per lb. \$33 per picul, as compared with \$23.20 and \$32.80 per picul respectively in September.

Pepper.—The Singapore market was dull in October, average prices per picul being as follows:—Singapore Black \$18.31, Singapore White \$24.06, Muntok White \$24.31. Corresponding prices in September were \$19.10, \$25.35 and \$25.90.

Cloves.—Demand slow, nominal prices only being quoted. The following are the average nominal prices per picul in Singapore in October: Zanzibar \$40.75, Amboina \$45.50, as compared with \$42 and \$45.60 respectively in September.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm Oil reports are kindly supplied by Messrs. Cumberbatch & Co., Ltd., Kuala Lumpur, the Singapore prices for coffee and arecanuts by the Lianqui Trading Company of Singapore.

1 picul = 133½ lbs. The Dollar is fixed at two shillings and four pence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agriculture products. Similar assistance is also offered by the Malayan Information Agency, 57, Charing Cross, London, S.W.1.

GENERAL RICE SUMMARY*

September, 1932.

Malaya.—Gross foreign imports of rice (including stocks available for re-export) during September, 1932, amounted to 54,548 tons as compared with 56,856 tons in September, 1931, of which 47.5 per cent. were consigned to Singapore, 19.8 per cent. to Penang, 9.6 per cent. to Malacca, 14.7 per cent. to the Federated Malay States, and 8.4 per cent. to the Unfederated Malay States.

Of these imports 67.7 per cent. were from Siam, 30.3 per cent. from Burma, 1.0 per cent. from French Indo-China and 1.0 per cent. from Other Countries.

Total foreign exports of rice in September, 1932, were 15,345 tons (including 240 tons domestic production exported from Penang) as compared with 11,739 tons in September, 1931. Of these exports 86.1 per cent. went to Netherlands India and 13.9 per cent. to Other Countries.

Net Imports for the period January to September, 1932, were 306,338 tons as compared with 406,695 tons for the same period of 1931, a fall of 24.7 per cent.

India and Burma.—Total foreign exports of rice (*Indian Trade Journal* 6.10.32) during August, 1932, were 113,000 tons as compared with 119,000 tons in July, 1932, and 145,000 tons in August, 1931, decreases of 5 per cent. in respect of the previous month and 22.1 per cent. in respect of the same period of the previous year.

Total exports during period January to August, 1932, were 1,650,000 tons as compared with 1,556,000 tons for the corresponding period of 1931, an increase of 94,000 tons or 6.0 per cent.

Total exports of rice and bran from Burma for the period January 1 to October 1, 1932, amounted to 2,556,079 tons as compared with 2,961,718 tons for the corresponding period of 1931, or a decrease of 13.7 per cent. Of these exports 705,645 tons went to India in 1932 as compared with 1,221,744 tons in 1931, a decrease of 42.2 per cent.

Japan.—The production of the rice crop of Japan for 1932 is estimated at 8,634,000 tons, which is 11 per cent. more than the actual crop of last year.

Korca.—The rice crop this year is estimated at 2,318,170 tons, an increase of 91,949 tons (4.1 per cent.) over the actual crop last year.

Siam.—Exports (approximate) of rice from Bangkok during September, 1932, amounted to 131,255 tons as compared with 70,443 tons in September, 1931 or an increase of 86.3 per cent.

Exports of rice from Bangkok during the period December 1931 to September, 1932, (the figures for August and September 1932 being approximate) amounted to 1,239,735 tons, an increase of 248,798 tons or 25.1 per cent. as compared with the same period of 1930-31.

* Abridged from the Rice Summary for September 1932, compiled by the Department of Statistics, S.S. and F.M.S.

At the end of July 1932, the area under padi in the provinces and inner circle amounted to 2,391,928 acres, an increase of 7.9 per cent. over that of the same time last year.

Netherlands India.—Java and Madura. *The Korte Berichten* of September 30, 1932, states that at the end of August, 1932, the area harvested amounted to 8,127,000 acres, an increase of 309,750 acres or 4.0 per cent. as compared with the same period of 1931, the area damaged to 320,647 acres, a decrease of 123,571 acres or 27.8 per cent. compared with 1931 and additional plantings awaiting harvest to 1,141,000 acres, an increase of 154,000 acres as compared with 1931, a total of 9,588,647 acres as compared with 9,248,468 acres for the same period of 1931, an increase of 3.7 per cent.

Imports of rice into Java and Madura during January to August, 1932, totalled 107,110 tons as compared with 195,163 tons for the same period of 1931 or a fall of 45.1 per cent.

Imports of rice into Outer Provinces during January to July 1932, totalled 144,334 tons as compared with 197,422 tons for the same period of 1931 or a fall of 26.9 per cent.

French Indo-China.—Entries of padi at the port of Cholon from January 1, 1932, to September 27, 1932, amounted to 883,231 (metric) tons, a decrease of 9,933 tons or 1.1 per cent. as compared with the same period of 1931.

Exports of rice from Saigon for the period January 1, 1932, to September 30, 1932, amounted to 905,298 (metric) tons, an increase of 118,765 tons or 15.1 per cent. as compared with the same period of 1931.

The *Indian Trade Journal* of September 29, 1932, states that in French Indo-China, the crop of the first semester in Annam was 981,000 acres, as compared with 877,000 acres last year, an increase of 11.9 per cent. and the yield was estimated at 315,230 tons against 244,280 tons during the same period of 1931, an increase of 29.0 per cent.

Ceylon.—Imports for 8 months to August 31, 1932, were 310,138 tons, an increase of 16,764 tons or 5.7 per cent. as compared with 1931.

Of these imports 20.7 per cent. were from British India, 69.3 per cent. from Burma, .3 per cent. from the Straits Settlements and 9.7 per cent. from Other Countries.

Europe and America.—During the period of January 1 to September 22, 1932, 804,469 tons were shipped from the East to Europe, as compared with 914,081 tons for the corresponding period of 1931. Of the 1932 shipments, 54.2 per cent. was from Burma and 36.1 per cent. from Saigon.

For the period January 1 to August 16, 1932, 43,730 tons of rice were shipped to the Levant from the East. In comparison with 1931 this is a decrease of 6.8 per cent.

To the West Indies and America, period January 1 to August 4, 1932, 94,480 tons of rice were shipped from the East, a decrease of 19,695 tons (17.2 per cent.) as compared with the corresponding period of 1931.

ACREAGE OF TAPPABLE RUBBER OUT OF TAPPING ON ESTATES OF 100 ACRES AND OVER, MALAYA, AT END OF SEPTEMBER, 1932.

STATE OR TERRITORY (1)	Acreage of Tappable Rubber end 1931 (2)	ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING		Total (3) + (5)	Percentage of (7) to (2)
		Acreage (3)	Percentage of (3) to (2) (4)	Acreage (5)	Percentage of (5) to (2) (6)		
FEDERATED MALAY STATES :—							
Perak	238,420	19,342	8.1	31,647	13.3	50,989	21.4
Selangor	294,030	20,308	6.9	39,025	13.3	59,333	20.2
Negeri Sembilan	217,002	21,647	10.0	21,518	9.9	43,165	19.9
Pahang	35,122	8,122	23.1	4,677	13.3	12,799	36.4
Total F.M.S. ...	784,574	69,419	8.8	96,867	12.3	166,286	21.2
STRAITS SETTLEMENTS :—							
Province Wellesley	44,055	3,605	8.2	9,492	21.5	13,097	29.7
Dindings	6,700	754	11.3	1,055	15.7	1,809	27.0
Malacca	110,288	4,954	4.5	22,391	20.3	27,345	24.8
Penang Island	1,585	977	61.6	20	1.8	1,006	63.5
Singapore Island	28,033	13,325	47.5	3,661	13.1	16,986	60.6
Total S.S. ...	190,661	23,615	12.4	36,628	19.2	60,243	31.6
UNFEDERATED MALAY STATES :—							
Johore	313,385	44,372	14.2	34,519	11.0	78,891	25.2
Kedah (a)	114,254	11,114	9.7	7,112	6.2	18,226	16.0
Kelantan (c)	16,785	6,184	36.8	1,590	9.5	7,774	46.3
Trengganu (b)	4,300	Nil	Nil	2,072	48.2	2,072	48.2
Perlis	903	106	11.7	462	51.2	568	62.9
Total U.M.S. ...	449,627	61,776	13.7	45,755	10.2	107,531	23.9
Total MALAYA ...	1,424,862	154,810	10.9	179,250	12.6	334,060	23.4

Notes :—1. (a) Registered companies only and are rendered quarterly, commencing with June 1931.

(b) Registered Companies only.

(c) The figures quoted for Kelantan are those for July—revised figures will be published when available.
The above table together with a Summary was prepared and published by the Statistics Department, S.S.
and F.M.S. on October 26, 1932.

ACREAGES OF TAPPABLE RUBBER OUT OF TAPPING IN NETHERLANDS INDIA AT END OF AUGUST, 1932.

	A Totally Ceased		B Partly Ceased		Total A and B	
	Estates	Area in Acres	Estates	Area in Acres	Estates	Area in Acres
Java and Madoera ...	254	166,053	40	12,832	294	178,865
Outer Provinces ...	206	91,980	60	29,428	266	121,408
Netherlands India ...	460	258,013	100	42,260	560	300,273

The total area for August amounts to 32 per cent. of the total tappable rubber as at end of December 1931.

Received by the Statistics Department from the Central Bureau of Statistics, Batavia.

MALAYAN PRODUCTION OF PALM OIL AND KERNELS.

Third Quarter, 1932.

(As declared by estates).

Month 1932.	Palm Oil.		Kernels.	
	F. M. S.	Johore	F. M. S.	Johore
	Tons	Tons	Tons	Tons
July ...	578.5	123.5	98.4	9.4
August ...	819.6	130.2	139.1	13.4
September ...	795.7	142.8	124.1	15.1
Total Third Quarter 1932 ...	2,193.8	396.5	361.5	37.9
Total Third Quarter 1931 ...	1,332.6	174.1	188.8	22.0

The total production for the first three quarters of 1932 was :—

Palm Oil : F.M.S. 5,224.7 tons, Johore 912.8 tons.

Kernels : F.M.S. 868.7 tons, Johore 101.8 tons.

The corresponding figures for 1931 were :—

Palm Oil : F.M.S. 3,076.8 tons, Johore 441.9 tons.

Kernels : F.M.S. 461.8 tons, Johore 65.3 tons.

MALAYA RUBBER STATISTICS TABLE I
STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERTEX,
FOR THE MONTH OF SEPTEMBER, 1932 IN DRY TONS.

Territory	Stocks at beginning of month 1				Production by Estates of 100 acres and over		Production by Estates of less than 100 acres estimated 2		Imports				Exports including re-exports				Stocks at end of month			
	Ports	Dealers	Estates of 100 acres and over	during the month	during the year 1932	during the month		during the year 1932		during the month		during the year 1932		Foreign	Local	Foreign	Local	Ports	Dealers	Estates of 100 acres and over
						Foreign	From Malay States	Foreign	From Malay States	Foreign	Local	Foreign	Local							
1		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
MALAY STATES :—																				
Federated Malay States	...	14,978	11,806	10,981	105,175	8,305	67,866		Nil	Nil	Nil	Nil	15,699	4,896	125,069	52,579	...	14,154	11,360	
Johore	...	2,957	3,350	3,560	32,749	2,583	30,525		Nil	11	Nil	56	936	5,650	8,876	54,438	...	2,795	3,080	
Kedah	...	747	2,034	1,961	20,262	1,115	8,319		Nil	Nil	Nil	Nil	820	2,659	6,035	22,775	...	597	1,781	
Perlis	...	36	12	5	56	6	53		Nil	Nil	Nil	Nil	Nil	10	Nil	94	...	35	14	
Kelantan	...	148	146	166	1,275	376	1,498		50	333	Nil	Nil	59	492	406	3,077	...	195	140	
Trengganu	...	53	50	113	938	57	471		Nil	Nil	Nil	Nil	170	Nil	Nil	1,409	...	55	50	
Total Malay States	...	18,921	17,458	16,786	160,455	12,442	109,232		50	11	333	56	17,514	13,877	140,326	134,365	...	17,831	16,425	
STRAITS SETTLEMENTS																				
Malacca	...	3,077	1,275	1,334	12,053	2,111	17,49		Nil	Nil	Nil	Nil	4,450	Nil	36,172	Nil	...	3,456	1,287	
Province Wellesley	...	135	561	415	3,996	...	...		Nil	Nil	Nil	13,497	5,808	Nil	46,357	Nil	...	138	455	
Dindings	...	223	103	83	833	...	...		Nil	13,893	3,512	134,497	14,201	Nil	137,240	Nil	...	186	94	
Penang	...	1,591	4,542	12	3	21	...		311	6,530	45,855	49,367	24,459	Nil	219,775	Nil	...	463	4,594	
Singapore	...	2,326	15,701	209	141	1,372	...		6,841	13,893	49,367	134,467	24,459	Nil	219,775	Nil	...	3,890	15,248	
Total Straits Settlements	...	3,917	23,678	2,160	1,976	18,275	2,111	17,549	6,891	13,904	49,700	134,553	41,973	13,877	360,105	134,365	...	4,353	23,622	
TOTAL MALAYA	...	3,917	42,599	19,018	18,762	178,730	4,553	126,781	6,891	13,904	49,700	134,553	41,973	13,877	360,105	134,365	...	4,353	41,453	

TABLE II
DEALERS' STOCKS, IN DRY TONS. 3

Class of Rubber	Federated Malay States	S'pore	Penang	Province Wellesley	Johore	Total
20	21	22	23	24	25	26
DRY RUBBER	11,303	12,887	4,190	3,549	1,133	33,062
WET RUBBER	2,851	2,361	404	231	1,662	7,509
TOTAL	14,154	15,248	4,594	3,780	2,795	40,571

TABLE III
FOREIGN EXPORTS

PORTS	For month 1932	during the year 1932
Singapore	...	25,768
Penang	...	11,308
Port Swettenham	...	4,004
Malacca	...	893
MALAYA	...	41,973

TABLE IV
DOMESTIC EXPORTS 4

AREA	For month 1932	during the year 1932
Malay States	...	...
Straits Settlements	35,626	309,621
MALAYA	...	35,626

Notes:—1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.

2. The production of estates of less than 100 acres is estimated from the formula: Production + Imports + Stocks at beginning of month = Exports + Stocks at end of month. + Consumption, i.e., Column [7] = Columns [13] + [14] + [17] + [19] + [21] + [23] + [25] + [27] + [29] + [31] + [33] + [35] + [37] + [39] + [41] + [43] + [45] + [47] + [49] + [51] + [53] + [55] + [57] + [59] + [61] + [63] + [65] + [67] + [69] + [71] + [73] + [75] + [77] + [79] + [81] + [83] + [85] + [87] + [89] + [91] + [93] + [95] + [97] + [99] + [101] + [103] + [105] + [107] + [109] + [111] + [113] + [115] + [117] + [119] + [121] + [123] + [125] + [127] + [129] + [131] + [133] + [135] + [137] + [139] + [141] + [143] + [145] + [147] + [149] + [151] + [153] + [155] + [157] + [159] + [161] + [163] + [165] + [167] + [169] + [171] + [173] + [175] + [177] + [179] + [181] + [183] + [185] + [187] + [189] + [191] + [193] + [195] + [197] + [199] + [201] + [203] + [205] + [207] + [209] + [211] + [213] + [215] + [217] + [219] + [221] + [223] + [225] + [227] + [229] + [231] + [233] + [235] + [237] + [239] + [241] + [243] + [245] + [247] + [249] + [251] + [253] + [255] + [257] + [259] + [261] + [263] + [265] + [267] + [269] + [271] + [273] + [275] + [277] + [279] + [281] + [283] + [285] + [287] + [289] + [291] + [293] + [295] + [297] + [299] + [301] + [303] + [305] + [307] + [309] + [311] + [313] + [315] + [317] + [319] + [321] + [323] + [325] + [327] + [329] + [331] + [333] + [335] + [337] + [339] + [341] + [343] + [345] + [347] + [349] + [351] + [353] + [355] + [357] + [359] + [361] + [363] + [365] + [367] + [369] + [371] + [373] + [375] + [377] + [379] + [381] + [383] + [385] + [387] + [389] + [391] + [393] + [395] + [397] + [399] + [401] + [403] + [405] + [407] + [409] + [411] + [413] + [415] + [417] + [419] + [421] + [423] + [425] + [427] + [429] + [431] + [433] + [435] + [437] + [439] + [441] + [443] + [445] + [447] + [449] + [451] + [453] + [455] + [457] + [459] + [461] + [463] + [465] + [467] + [469] + [471] + [473] + [475] + [477] + [479] + [481] + [483] + [485] + [487] + [489] + [491] + [493] + [495] + [497] + [499] + [501] + [503] + [505] + [507] + [509] + [511] + [513] + [515] + [517] + [519] + [521] + [523] + [525] + [527] + [529] + [531] + [533] + [535] + [537] + [539] + [541] + [543] + [545] + [547] + [549] + [551] + [553] + [555] + [557] + [559] + [561] + [563] + [565] + [567] + [569] + [571] + [573] + [575] + [577] + [579] + [581] + [583] + [585] + [587] + [589] + [591] + [593] + [595] + [597] + [599] + [601] + [603] + [605] + [607] + [609] + [611] + [613] + [615] + [617] + [619] + [621] + [623] + [625] + [627] + [629] + [631] + [633] + [635] + [637] + [639] + [641] + [643] + [645] + [647] + [649] + [651] + [653] + [655] + [657] + [659] + [661] + [663] + [665] + [667] + [669] + [671] + [673] + [675] + [677] + [679] + [681] + [683] + [685] + [687] + [689] + [691] + [693] + [695] + [697] + [699] + [701] + [703] + [705] + [707] + [709] + [711] + [713] + [715] + [717] + [719] + [721] + [723] + [725] + [727] + [729] + [731] + [733] + [735] + [737] + [739] + [741] + [743] + [745] + [747] + [749] + [751] + [753] + [755] + [757] + [759] + [761] + [763] + [765] + [767] + [769] + [771] + [773] + [775] + [777] + [779] + [781] + [783] + [785] + [787] + [789] + [791] + [793] + [795] + [797] + [799] + [801] + [803] + [805] + [807] + [809] + [811] + [813] + [815] + [817] + [819] + [821] + [823] + [825] + [827] + [829] + [831] + [833] + [835] + [837] + [839] + [841] + [843] + [845] + [847] + [849] + [851] + [853] + [855] + [857] + [859] + [861] + [863] + [865] + [867] + [869] + [871] + [873] + [875] + [877] + [879] + [881] + [883] + [885] + [887] + [889] + [891] + [893] + [895] + [897] + [899] + [901] + [903] + [905] + [907] + [909] + [911] + [913] + [915] + [917] + [919] + [921] + [923] + [925] + [927] + [929] + [931] + [933] + [935] + [937] + [939] + [941] + [943] + [945] + [947] + [949] + [951] + [953] + [955] + [957] + [959] + [961] + [963] + [965] + [967] + [969] + [971] + [973] + [975] + [977] + [979] + [981] + [983] + [985] + [987] + [989] + [991] + [993] + [995] + [997] + [999] + [1001] + [1003] + [1005] + [1007] + [1009] + [1011] + [1013] + [1015] + [1017] + [1019] + [1021] + [1023] + [1025] + [1027] + [1029] + [1031] + [1033] + [1035] + [1037] + [1039] + [1041] + [1043] + [1045] + [1047] + [1049] + [1051] + [1053] + [1055] + [1057] + [1059] + [1061] + [1063] + [1065] + [1067] + [1069] + [1071] + [1073] + [1075] + [1077] + [1079] + [1081] + [1083] + [1085] + [1087] + [1089] + [1091] + [1093] + [1095] + [1097] + [1099] + [1101] + [1103] + [1105] + [1107] + [1109] + [1111] + [1113] + [1115] + [1117] + [1119] + [1121] + [1123] + [1125] + [1127] + [1129] + [1131] + [1133] + [1135] + [1137] + [1139] + [1141] + [1143] + [1145] + [1147] + [1149] + [1151] + [1153] + [1155] + [1157] + [1159] + [1161] + [1163] + [1165] + [1167] + [1169] + [1171] + [1173] + [1175] + [1177] + [1179] + [1181] + [1183] + [1185] + [1187] + [1189] + [1191] + [1193] + [1195] + [1197] + [1199] + [1201] + [1203] + [1205] + [1207] + [1209] + [1211] + [1213] + [1215] + [1217] + [1219] + [1221] + [1223] + [1225] + [1227] + [1229] + [1231] + [1233] + [1235] + [1237] + [1239] + [1241] + [1243] + [1245] + [1247] + [1249] + [1251] + [1253] + [1255] + [1257] + [1259] + [1261] + [1263] + [1265] + [1267] + [1269] + [1271] + [1273] + [1275] + [1277] + [1279] + [1281] + [1283] + [1285] + [1287] + [1289] + [1291] + [1293] + [1295] + [1297] + [1299] + [1301] + [1303] + [1305] + [1307] + [1309] + [1311] + [1313] + [1315] + [1317] + [1319] + [1321] + [1323] + [1325] + [1327] + [1329] + [1331] + [1333] + [1335] + [1337] + [1339] + [1341] + [1343] + [1345] + [1347] + [1349] + [1351] + [1353] + [1355] + [1357] + [1359] + [1361] + [1363] + [1365] + [1367] + [1369] + [1371] + [1373] + [1375] + [1377] + [1379] + [1381] + [1383] + [1385] + [1387] + [1389] + [1391] + [1393] + [1395] + [1397] + [1399] + [1401] + [1403] + [1405] + [1407] + [1409] + [1411] + [1413] + [1415] + [1417] + [1419] + [1421] + [1423] + [1425] + [1427] + [1429] + [1431] + [1433] + [1435] + [1437] + [1439] + [1441] + [1443] + [1445] + [1447] + [1449] + [1451] + [1453] + [1455] + [1457] + [1459] + [1461] + [1463] + [1465] + [1467] + [1469] + [1471] + [1473] + [1475] + [1477] + [1479] + [1481] + [1483] + [1485] + [1487] + [1489] + [1491] + [1493] + [1495] + [1497] + [1499] + [1501] + [1503] + [1505] + [1507] + [1509] + [1511] + [1513] + [1515] + [1517] + [1519] + [1521] + [1523] + [1525] + [1527] + [1529] + [1531] + [1533] + [1535] + [1537] + [1539] + [1541] + [1543] + [1545] + [1547] + [1549] + [1551] + [1553] + [1555] + [1557] + [1559] + [1561] + [1563] + [1565] + [1567] + [1569] + [1571] + [1573] + [1575] + [1577] + [1579] + [1581] + [1583] + [1585] + [1587] + [1589] + [1591] + [1593] + [1595] + [1597] + [1599] + [1601] + [1603] + [1605] + [1607] + [1609] + [1611] + [1613] + [1615] + [1617] + [1619] + [1621] + [1623] + [1625] + [1627] + [1629] + [1631] + [1633] + [1635] + [1637] + [1639] + [1641] + [1643] + [1645] + [1647] + [1649] + [1651] + [1653] + [1655] + [1657] + [1659] + [1661] + [1663] + [1665] + [1667] + [1669] + [1671] + [1673] + [1675] + [1677] + [1679] + [1681] + [1683] + [1685] + [1687] + [1689] + [1691] + [1693] + [1695] + [1697] + [1699] + [1701] + [1703] + [1705] + [1707] + [1709] + [1711] + [1713] + [1715] + [1717] + [1719] + [1721] + [1723] + [1725] + [1727] + [1729] + [1731] + [1733] + [1735] + [1737] + [1739] + [1741] + [1743] + [1745] + [1747] + [1749] + [1751] + [1753] + [1755] + [1757] + [1759] + [1761] + [1763] + [1765] + [1767] + [1769] + [1771] + [1773] + [1775] + [1777] + [1779] + [1781] + [1783] + [1785] + [1787] + [1789] + [1791] + [1793] + [1795] + [1797] + [1799] + [1801] + [1803] + [1805] + [1807] + [1809] + [1811] + [1813] + [1815] + [1817] + [1819] + [1821] + [1823] + [1825] + [1827] + [1829] + [1831] + [1833] + [1835] + [1837] + [1839] + [1841] + [1843] + [1845] + [1847] + [1849] + [1851] + [1853] + [1855] + [1857] + [1859] + [1861] + [1863] + [1865] + [1867] + [1869] + [1871] + [1873] + [1875] + [1877] + [1879] + [1881] + [1883] + [1885] + [1887] + [1889] + [1891] + [1893] + [1895] + [1897] + [1899] + [1901] + [1903] + [1905] + [1907] + [1909] + [1911] + [1913] + [1915] + [1917] + [1919] + [1921] + [1923] + [1925] + [1927] + [1929] + [1931] + [1933] + [1935] + [1937] + [1939] + [1941] + [1943] + [1945] + [1947] + [1949] + [1951] + [1953] + [1955] + [1957] + [1959] + [1961] + [1963] + [1965] + [1967] + [1969] + [1971] + [1973] + [1975] + [1977] + [1979] + [1981] + [1983] + [1985] + [1987] + [1989] + [1991] + [1993] + [1995] + [1997] + [1999] + [2001] + [2003] + [2005] + [2007] + [2009] + [2011] + [2013] + [2015] + [2017] + [2019] + [2021] + [2023] + [2025] + [2027] + [2029] + [2031] + [2033] + [2035] + [2037] + [2039] + [2041] + [2043] + [2045] + [2047] + [2049] + [2051] + [2053] + [2055] + [2057] + [2059] + [2061] + [2063] + [2065] + [2067] + [2069] + [2071] + [2073] + [2075] + [2077] + [2079] + [2081] + [2083] + [2085] + [2087] + [2089] + [2091] + [2093] + [2095] + [2097] + [2099] + [2101] + [2103] + [2105] + [2107] + [2109] + [2111] + [2113] + [2115] + [2117] + [2119] + [2121] + [2123] + [2125] + [2127] + [2129] + [2131] + [2133] + [2135] + [2137] + [2139] + [2141] + [2143] + [2145] + [2147] + [2149] + [2151] + [2153] + [2155] + [2157] + [2159] + [2161] + [2163] + [2165] + [2167] + [2169] + [2171] + [2173] + [2175] + [2177] + [2179] + [2181] + [2183] + [2185] + [2187] + [2189] + [2191] + [2193] + [2195] + [2197] + [2199] + [2201] + [2203] + [2205] + [2207] + [2209] + [2211] + [2213] + [2215] + [2217] + [2219] + [2221] + [2223] + [2225] + [2227] + [2229] + [2231] + [2233] + [2235] + [2237] + [2239] + [2241] + [2243] + [2245] + [2247] + [2249] + [2251] + [2253] + [2255] + [2257] + [2259] + [2261] + [2263] + [2265] + [2267] + [2269] + [2271] + [2273] + [2275] + [2277] + [2279] + [2281] + [2283] + [2285] + [2

METEOROLOGICAL SUMMARY, MALAYA, SEPTEMBER, 1932.

Locality	AIR TEMPERATURE IN DEGREES FAHRENHEIT					EARTH TEMPERATURE		RAINFALL						BRIGHT SUNSHINE			
	Means of			Absolute Extremes		At I foot	At 4 feet	Total		Most in a day	Number of days				Total	Daily Mean	Per cent
	A.	B.	Min.	Mean of A and B	Highest Max.			Lowest Min.	Lowest Max.		Highest Min.	Thunder- storm	Fog morning obs.	Gale force 8 or more			
	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	in.				Precipitation .01 in or more	Precipitation .05 in or more	hr.
Railway Hill, Kuala Lumpur, Selangor	90.1	71.6	80.9	93	67	83.4	84.4	6.58	167.1	2.22	14	12	4		161.05	5.37	44
Bukit Jeram, Selangor	87.7	72.5	80.1	90	70	83.2	85.2	5.53	140.5	1.04	16	13		2	186.25	6.21	52
Sitiawan, Perak	90.0	72.6	81.3	94	70	84.5	85.4	4.61	117.1	1.47	12	8	2	1	166.40	5.55	46
Kroh, Perak	84.3	69.0	76.7	89	66	81.0	82.3	11.85	301.0	2.65	24	18	2	4	140.55	4.69	39
Temerloh, Pahang	88.8	72.1	80.4	92	69	84.5	85.5	5.47	138.9	1.10	18	17	3	11	150.10	5.00	41
Kuala Lipis, Pahang	89.7	71.3	80.5	95	67	83.6	84.9	9.62	244.3	3.67	14	11	4	21	156.60	5.22	43
Kuala Pahang, Pahang	87.8	73.7	80.7	92	71	85.6	86.3	3.52	89.4	0.92	14	10	1		196.30	6.54	54
Mount Faber, Singapore	86.8	74.4	80.6	91	70	81.9	83.0	9.74	247.4	2.38	16	13	4	1	167.10	5.57	46
Butterworth, Province Wel- lesley	86.3	73.5	79.9	90	71	83.2	85.0	16.43	417.3	4.07	21	18			147.20	4.91	41
Bukit China, Malacca	84.5	73.6	79.1	88	71	82.9	84.0	5.70	144.8	2.26	17	11	3		161.85	5.39	45
Kluang, Johore	87.5	71.3	79.4	92	69	81.3	82.0	6.74	171.2	2.35	17	14	4	6	133.95	4.47	37
Bukit Lalang, Mersing, Johore	86.8	71.6	79.2	90	69	80.9	81.5	10.34	262.6	4.20	14	14	2		157.45	5.25	43
Alor Star, Kedah	86.7	73.9	80.3	90	71	85.4	86.4	13.40	340.4	2.95	22	20	5	5	159.45	5.32	44
Kota Bahru, Kelantan	88.8	73.5	81.1	93	71	84.3	85.4	9.38	238.3	2.11	16	10	4		189.20	6.31	51
Kuala Trengganu, Trengganu	88.6	72.3	80.5	91	69	83.5	85.2	3.29	83.6	0.96	11	9	4		176.50	5.88	49
HILL STATIONS.																	
Fraser's Hill, Pahang 4268 ft.	73.6	62.5	68.1	77	60	70.8	71.5	5.18	131.6	1.31	16	12	3		147.95	4.93	40
Pahang Highlands, Tanah Rata, Pahang 4750 ft.	70.9	58.6	64.7	74	53	69.0	69.3	6.06	153.9	1.43	20	18	5		112.10	3.74	31
Cameron Highlands, Rhodo- dendron Hill, Pahang 5120 ft.	70.3	58.8	64.5	75	55	61	61	6.43	163.3	1.29	21	16	4	9	119.70	3.99	33

